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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

October 5, 1932

What the Stars Say

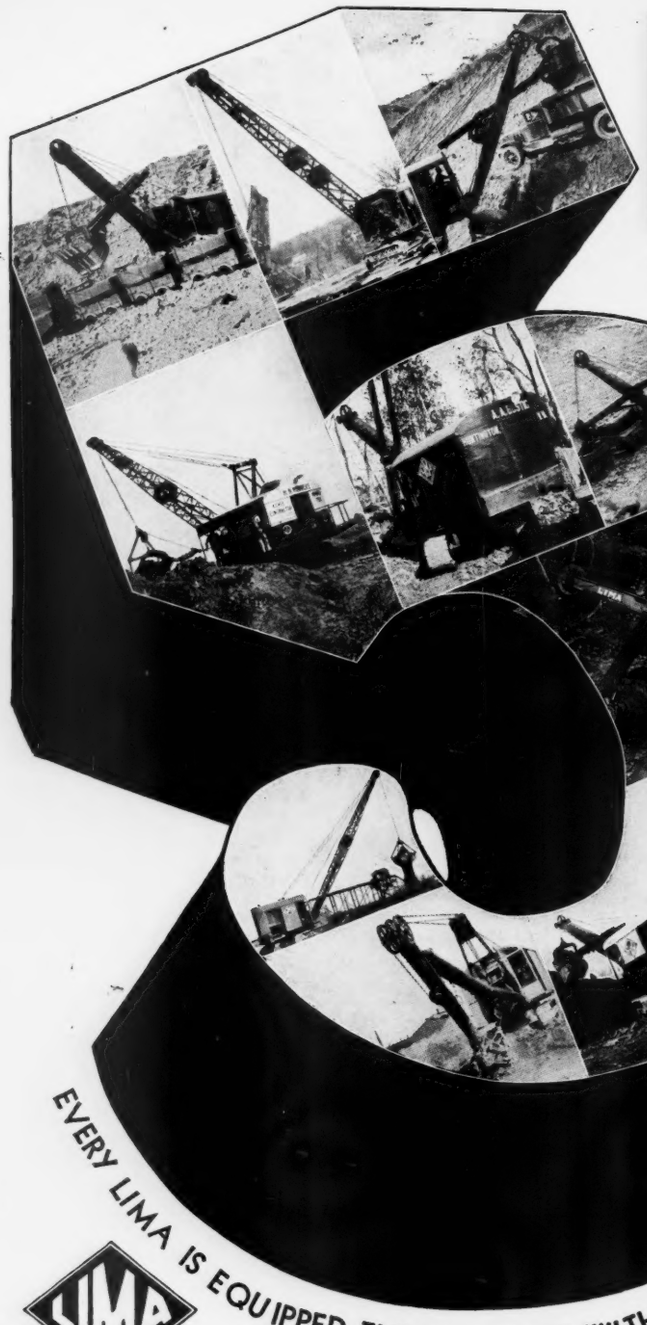
With so many people in a skeptical frame of mind, when it comes to recognizing and admitting the increasing evidence of business recovery, it becomes necessary to collect the evidence and present it in blocks of sufficient size to impress those who demand bulk. The average mind discloses little capacity for assimilating and classifying even comparable data, much less the separate and seemingly unrelated facts that fill the press, so there is small cause for wonder that the increasing evidence of business revival is not bringing the widespread conviction which should result. The evidence, unfortunately, has been scattering in nature and occurrence, and no one has taken the trouble to bring it together.

In this and the preceding issues of PIT AND QUARRY the rapidly accumulating evidence of renewed buying activity on the part of nonmetallic-mineral producers has been given special emphasis. Each piece of news about the purchase of new equipment or the remodeling of old plants in the interest of increased producing efficiency is identified by a large star. While none of these evidences would ordinarily escape the attentive reader, their total significance is not at once apparent, hence the adoption of this simple method of focusing the eye and the mind on facts that are of individual and industrial importance.

"Meeting Competition by Beating It" we have called this type of news, and it is just that. It is already apparent to many producers, in our industries as in others, that the new competition is new in other points besides time. It is new in the profit-rate, it is new in the determination not to produce without making a profit, it is new in the degree of efficiency that prevails and will prevail. Just as it has called for a change of mental attitude—and for many this has meant nothing short of a complete right-about-face—so it calls for a new approach to the problems of production, chief of which is the need for producing a good product as well as a low-priced one. Both changes present a novel situation—not to say a revolutionary one—to many producers, who have persisted too long in the theory that low prices alone will sell their products and that quality is a luxury with which business can convenienty dispense.

Every producer whose developments are marked with a star has his eye on the coming competition and he is determined to meet it by beating it. This is one of the most encouraging signs of the times; it marks, as we have said, the adoption of a fresh attitude toward the future. To those who have not yet taken this new view, to those who have hesitated to believe in the reality of the upward swing of business, we say: "Watch the stars; they indicate the promise as well as the threat of the future."

Since September 11, 1929, the largest net paid A. B. C. circulation in the field



LIMAS

A SIZE AND TYPE FOR EVERY JOB

101
1 Yd. 1¼ Yd.
1½ Yd.

302
¾ Yd.

404
1-Yd.

502
1¼ Yd.

601
1½ Yd.

EVERY LIMA IS EQUIPPED THROUGHOUT WITH ROLLER BEARINGS

LIMA

LIMA shovels, cranes, draglines and backdiggers are built in sizes ranging from ¾ cubic yard to 1 ½ cubic yard capacities.

Many new and exclusive features are incorporated in their design,—features which assure longer life, lower upkeep and greater profits. With the right size and type to exactly fit your requirements more efficiently than ever before, you'll be interested in knowing more about LIMA.

Write for bulletin.

THE OHIO POWER SHOVEL COMPANY, Lima, Ohio, U. S. A.

DIVISION LIMA LOCOMOTIVE WORKS, INCORPORATED

The General Supply Co. of Canada, Ltd. Ottawa, Ont.

SEATTLE 2244 First Ave. So.

CHICAGO 2026 Straus Bldg.

NEWARK, N. J. 317 Frelinghuysen Avenue

DALLAS 1301 So. Lamar St.

MEMPHIS 1201 Cotton Exchange Bldg.

Tyee Machinery Company, Ltd. Vancouver, B. C.

LIMA

101·302·404
502 and 601

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This is what one Quarry Superintendent writes about N. Y. B. & P. Co. Products...

CURRENT

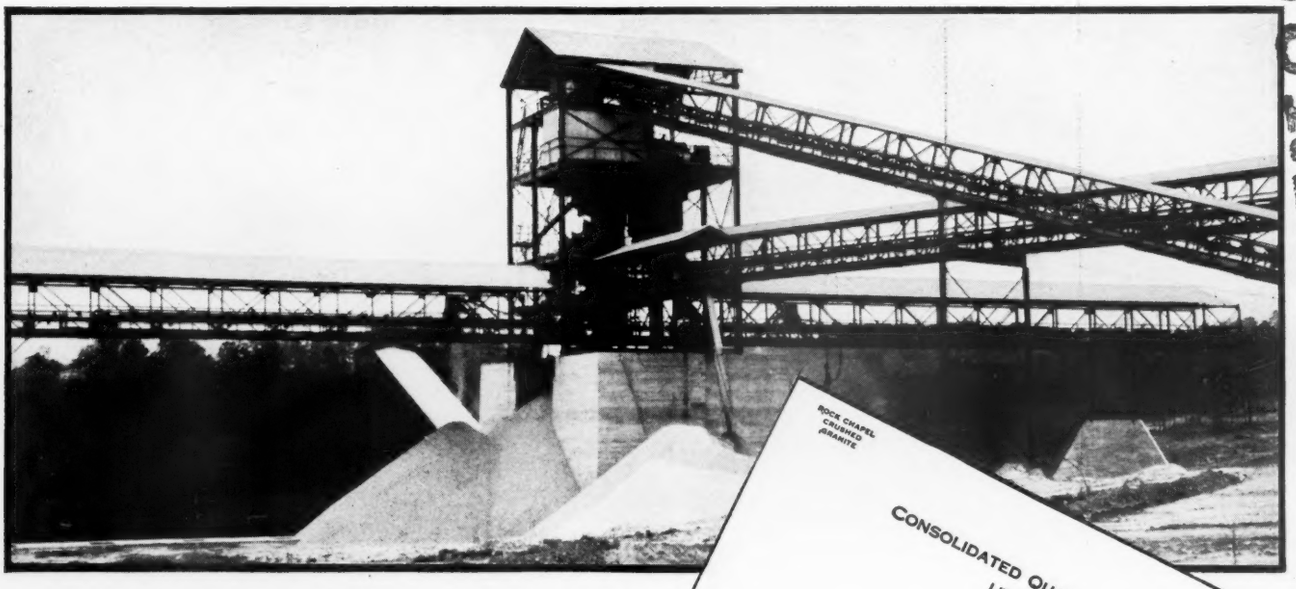
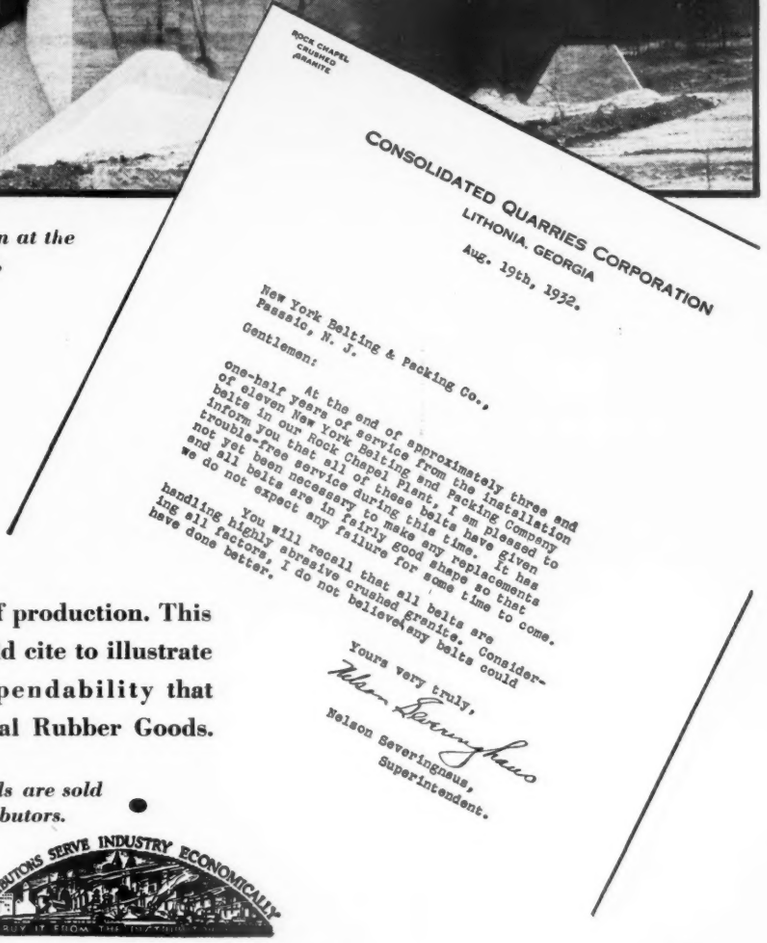


Illustration shows three giant conveyors in action at the Consolidated Quarries Corporation Plant, near Atlanta, Georgia.



ROCK CHAPEL CRUSHED GRANITE

CONSOLIDATED QUARRIES CORPORATION
LITHONIA, GEORGIA

Aug. 19th, 1932.

New York Belting & Packing Co.,
Passaic, N. J.

Gentlemen:

At the end of approximately three and one-half years of service from the installation of eleven New York Belting and Packing Company belts in our Rock Chapel Plant, I am pleased to inform you that all of these belts have given trouble-free service during this time. It has not yet been necessary to make any replacements and all belts are in fairly good shape so that we do not expect any failure for some time to come.

You will recall that all belts are handling highly abrasive crushed granite. Considering all factors, I do not believe any belts could have done better.

Yours very truly,
Nelson Severinghaus
Nelson Severinghaus,
Superintendent.

...MR. NELSON SEVERINGHAUS Superintendent Consolidated Quarries Corporation writes in his letter, reproduced for your perusal, a better advertisement than we could possibly phrase. His conveyors are called upon to maintain a most rigid and exacting schedule of production. This is but one of many examples which we could cite to illustrate the economy, efficiency and certain dependability that characterize all N. Y. B. & P. Mechanical Rubber Goods.

N. Y. B. & P. Mechanical Rubber Goods are sold exclusively through competent distributors.

DISTRIBUTORS SERVE INDUSTRY ECONOMICALLY
BUY IT FROM THE DISTRIBUTOR

NEW YORK BELTING & PACKING CO.

1790 BROADWAY — FOUNDED 1846 — NEW YORK CITY

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 25 October 5, 1932 Number 1

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published bi-weekly on Wednesday for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

Copyright 1932 by
COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

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Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, Central, and South America; elsewhere (including Canada) $1 additional for each year. Single copies 20 cents

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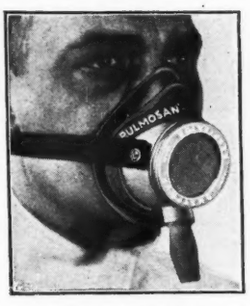

R-110—Dustpruf Respirator
Widely used to protect against fine dust and spray mists. Weighs only 2½ oz. Comfortable. Adjustable.

No. 35—Respirator Hood
Dust-tight cloth, fitted with felt filter respirator. Protects head and neck.

WHEN the majority of the largest companies, in every branch of industry, place their confidence in PULMOSAN RESPIRATORS . . . and prove it with steady repeat orders . . .

. . . that's the kind of "sales talk" that really means something!

It means that these companies—every one a shrewd buyer—have adopted PULMOSAN RESPIRATORS as the result of exacting tests made. And *continue* to buy them because they are giving complete satisfaction.

No "one-time" sales here—you can judge PULMOSAN RESPIRATORS by the companies they KEEP!

These companies know that PULMOSAN RESPIRATORS provide dependable, adequate nose, throat and lung protection for their workmen . . . that they have invested in serviceable equipment . . . and that they paid a fair price consistent with quality represented.

Be guided by the judgment of these cautious buyers. Write for full information and prices.

•

Pulmosan Safety Equipment Corp.
176 Johnson St. Brooklyn, N. Y.

Pulmosan Safety Equipment Corp.,
176 Johnson St., Brooklyn, N. Y.

Gentlemen: Please send literature and prices on PULMOSAN RESPIRATOR line, without obligation ☐. Send file of other industrial safety equipment ☐.

Firm Name .....
Individual .....
Address .....
City..... State.....

P&Q 10-5

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Agitators, Thickeners and Slurry Mixers
Traylor Eng. & Mfg. Co.

Air Compressors
Traylor Eng. & Mfg. Co.

Air Separators
Bradley Pulverizer Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Universal Road Machinery Co.

Automatic Feeders
Schaffer Poidometer Co.

Automatic Weighers
Schaffer Poidometer Co.

Babbitt Metal
Ryerson and Son, Inc., Joseph T.

Balls (Grinding)
Kennedy-Van Saun Mfg. and Eng. Corp.

Balls (Tube-Mill, etc.)
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Belting
Manheim Mfg. and Belting Co.
New York Belting and Packing Co.

Belt Dressing
Dixon Crucible Co., Joseph

Bin Gates
Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Bins (Steel)
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Supplies
Ensign-Bickford Co.

Borings, Core
Pennsylvania Drilling Co.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Elevator and Conveyor)
Cross Engineering Co.
Iowa Mfg. Co.
McLanahan and Stone Corp.
Smith Engineering Works

Cableways
American Steel & Wire Co.
Leschen and Sons Rope Co., A.

Capstans (See Winches and Capstans)

Carriers
Smith Engineering Works

Car Wheels—(See Wheels—Car)

Castings
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Chain (Elevating and Conveying)
Cross Engineering Co.

Chutes and Chute Liners
Cross Engineering Co.
Iowa Mfg. Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
New York Belting and Packing Co.

Clamshell Buckets (See Buckets—Clamshell, Orange-peel, etc.)

Clamshell Gates (See Gates-Clamshell)

Classifiers
Allen Cone and Machy. Corp.
Bradley Pulverizer Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.

Clips (Wire Rope)
American Steel & Wire Co.
Leschen and Sons Rope Co., A.

Coal-Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Bradley Pulverizer Co.
Gay Co., Inc., Rubert M.
Kennedy-Van Saun Mfg. and Eng. Corp.

Compressors (See Air Compressors)

Cones (Sand-Washing)
Allen Cone and Machy. Corp.
Iowa Mfg. Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Iowa Mfg. Co.

Conveyors and Elevators
Allis-Chalmers Mfg. Co.
Cross Engineering Co.
Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

Coolers (See Kilns and Coolers—Rotary)

Cranes (Crawler and Locomotive)
Ohio Power Shovel Co.

Crusher Parts
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
Gruendler Crusher and Pulverizer Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Crushers (Jaw and Gyratory)
Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co
Gruendler Crusher and Pulverizer Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Crushers (Rotary)
Allis-Chalmers Mfg. Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Traylor Eng. & Mfg. Co.

Diesel Engines (See Engines—Diesel)

Dragline Excavators
Ohio Power Shovel Co.

Dredge Chain (See Chain)

Dredge Pipe (See Pipe)

Dredges
Morris Machine Works

Drilling Accessories
Loomis Machine Co.

Drilling Contractors
Pennsylvania Drilling Co.

Drills (Blast-Hole)
Loomis Machine Co.

Drills, Diamond
Pennsylvania Drilling Co.

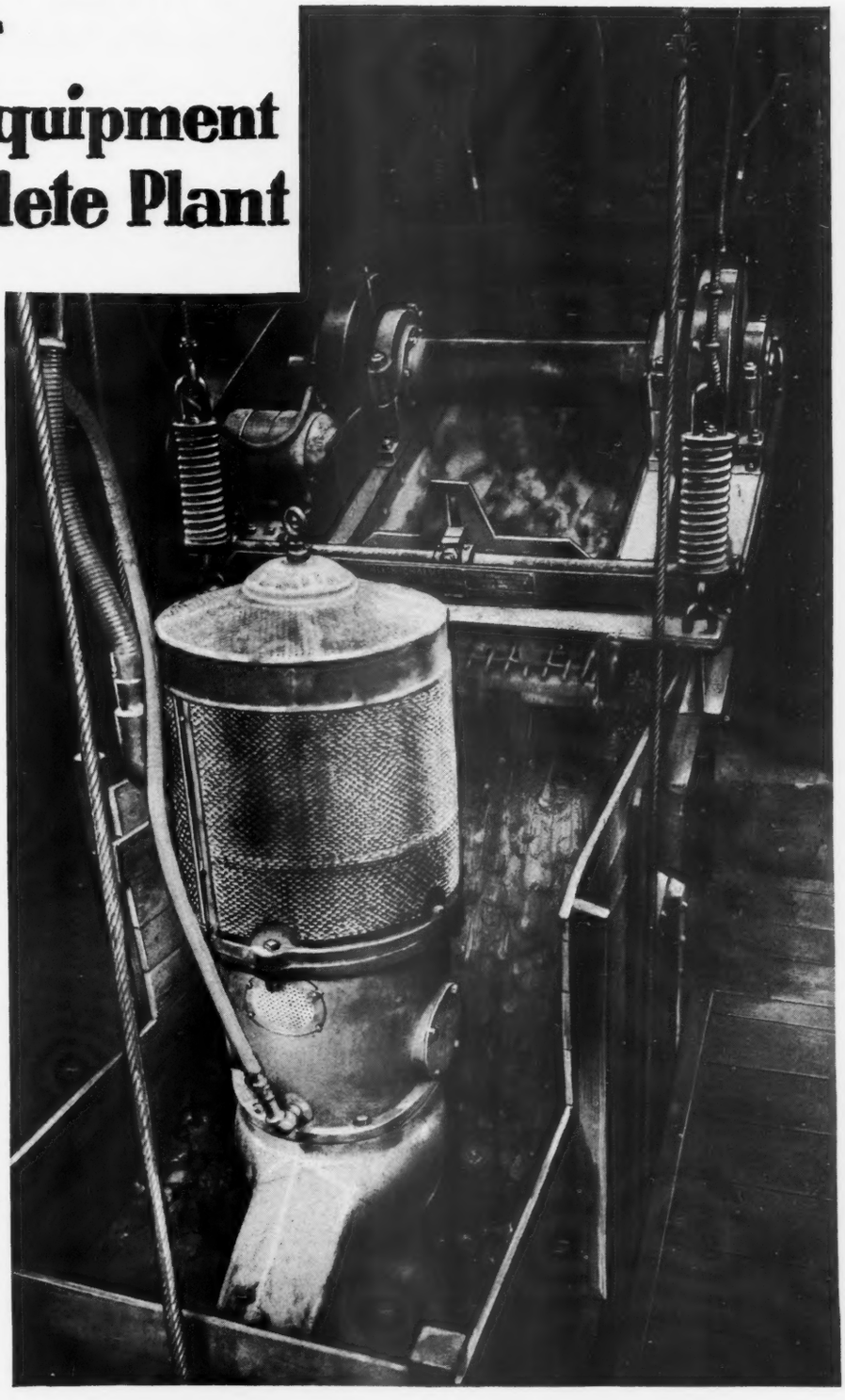
Drills (Rock)
Loomis Machine Co.

Drills (Well) (See Drills—Blast-Hole)

Crushers-Screens

+

all other Equipment for a Complete Plant



"Equipped by Allis-Chalmers" — You read that statement in the trade papers and you hear it repeated by operators everywhere. It is an indication of the Company's ability to serve the industry.

It means that Allis-Chalmers supplies not only crushers, screens, washing equipment and all of the auxiliaries that go to make up a complete plant and the motors and drives to run it, but also engineering service to help select the proper equipment for the particular plant and to co-ordinate it for the best operation.

Allis-Chalmers products for the crushing, screening or washing plant are briefly described in Leaflet 2144. We would like to send you a copy.

◈◈◈

The Allis-Chalmers 27" Gyratory Crusher, Vibrating Screen and Newhouse Crusher shown here are operating in the plant of the Francey Stone Company, Milwaukee.

◈◈◈

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

ALLIS-CHALMERS

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Drives (Multiple Belt, Chain, Rope)

Allis-Chalmers Mfg. Co.

Dryers

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
McLanahan and Stone Corp.
Traylor Eng. & Mfg. Co.

Dust-Collecting Systems

Allis-Chalmers Mfg. Co.

Dust Hoods and Helmets

Pulmosan Safety Equipment Co.

Dynamite (See Explosives)

Electrical Equipment

Allis-Chalmers Mfg. Co.

Elevators (See Conveyors and Elevators)

Elevator Belting (See Belting)

Engineers

Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Cross Engineering Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Engines (Steam)

Morris Machine Works

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Fans (Exhaust)

Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Morrow Mfg. Co.
Smith Engineering Works

Fuses (Detonating)

Ensign-Bickford Co.

Gaskets

New York Belting and Packing Co.

Gasoline Engines (See Engines —Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gelatin (See Explosives)

Generators (See Motors and Generators)

Glass Sand Equipment

Lewistown Foundry & Machine Co.

Goggles

Pulmosan Safety Equipment Co.

Grab Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

Graphite

Dixon Crucible Co., Joseph

Greases

Dixon Crucible Co., Joseph

Grinding Balls (See Balls, Grinding)

Grizzlies

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

Guns (Hydraulic)

Binks Mfg. Co.
Georgia Iron Works

Hammer Mills (See Crushers—Hammer)

Hoists

Iowa Mfg. Co.
McLanahan and Stone Corp.
Smith Engineering Works

Hose (Air, Steam and Water)

New York Belting and Packing Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

Idlers

Allis-Chalmers Mfg. Co.
Smith Engineering Works

Kilns and Coolers (Rotary)

Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Traylor Eng. & Mfg. Co.

Lime-Handling Equipment

Iowa Mfg. Co.

Lime Kilns

Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Locomotives (Electric, Gas and Steam)

Lima Locomotive Works

Lubricants

Dixon Crucible Co., Joseph

Magnetic Clutches (See Clutches, Magnetic)

Mills (Grinding) (See also Crushers—Hammer)

Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Bradley Pulverizer Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Traylor Eng. & Mfg. Co.

Mill Liners and Linings

Kennedy-Van Saun Mfg. and Eng. Corp.
New York Belting and Packing Co.

Motors and Generators

Allis-Chalmers Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails

American Steel & Wire Co.

Nozzles (Hydraulic) (See Guns —Hydraulic)

Nozzles (Suction Screen)

Binks Mfg. Co.

Ore Separators

Allen Cone and Machy. Corp.

Oxygen (Liquid) (See Liquid Oxygen)

Packing

New York Belting and Packing Co.

Perforated Metal Plates

Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engineering Co.
Morrow Mfg. Co.

Pipe Flanges

Georgia Iron Works

Plug Valves (See Valves)

Pneumatic Drills (See Drills, Rock)

Poidometers

Schaffer Poidometer Co.

Portable Conveyors

Iowa Mfg. Co.

Portable Engines (See Engines —Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)

American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Proportioning Equipment

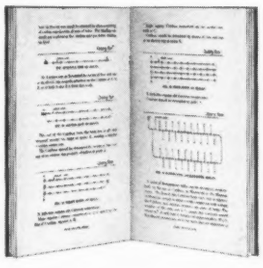
Schaffer Poidometer Co.

Pulverized Fuel Systems

Gay Co., Rubert M.
Kennedy-Van Saun Mfg. and Eng. Corp.

CORDEAU-BICKFORD and GOLD

. . . at Alaska-Juneau



You will be interested in a booklet just published, describing Cordeau-Bickford and its many uses. A copy will be sent you —free—on request.

The method of blasting employed at the Alaska-Juneau Mines is new proof of the practical value of Cordeau-Bickford Detonating Fuse. Affording a positive and practically instantaneous hook-up for the detonating wave, Cordeau insures complete and co-ordinated detonation of all loads, whether these be placed in drill holes (continuous or in deck loads), in tunnels, or as "mud caps."

The fact that Cordeau-Bickford is an insensitive material, and is unaffected by weather conditions, enables miners and quarrymen to safely employ Cordeau to meet special blasting problems. The Ensign-Bickford Company, Simsbury, Conn.

THE ENSIGN-BICKFORD CO. CORDEAU BICKFORD SIMSBURY, CONN.

CORDEAU
DETONATING FUSE
BICKFORD

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Pulverizers (See also Crushers; Mills; etc.)

Allis-Chalmers Mfg. Co.
Bradley Pulverizer Co.
Gruendler Crusher and Pulverizer Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.

Pump Valves (See Valves, Pump)

Pumps (Cement Slurry)

Morris Machine Works

Pumps (Centrifugal)

Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Georgia Iron Works
Morris Machine Works

Pumps (Dredging)

Allis-Chalmers Mfg. Co.
Georgia Iron Works
Morris Machine Works

Pumps (Sand and Gravel)

Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Georgia Iron Works
Morris Machine Works

Purifiers, Steam (See Steam Purifiers)

Respirators

Pulmosan Safety Equipment Co.

Rock Drills (See Drills—Rock)

Rod Mills

Kennedy-Van Saun Mfg. and Eng. Corp.
Traylor Eng. & Mfg. Co.

Roofing and Siding

Ryerson and Son, Inc., Joseph T.

Rope (Wire) (See Wire Rope)

Rubbish Burners

Cross Engineering Co.

Safety Equipment

Pulmosan Safety Equipment Co.

Sand Separators

Allen Cone and Machy. Corp.
Iowa Mfg. Co.
McLanahan and Stone Corp.
Smith Engineering Works

Sand-Settling Tanks

Allen Cone and Machy. Corp.
Smith Engineering Works

Scrapers (Power Drag)

Iowa Mfg. Co.

Screens

Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engineering Co.
Deister Machine Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

Screens (Vibrating or Shaking)

Allen Cone and Machy. Corp.
Deister Machine Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.

Separators (Air) (See Air Separators)

Sheaves

Allis-Chalmers Mfg. Co.
Gruendler Crusher and Pulverizer Co.
McLanahan and Stone Corp.

Shovels (Electric, Internal Combustion and Steam)

Ohio Power Shovel Co.

Skip Hoists and Skips

Allis-Chalmers Mfg. Co.

Speed Reduction Units

Iowa Mfg. Co.

Spouts (See Chutes and Chute Liners)

Sprockets and Chain

Iowa Mfg. Co.

Steel (Bars, Shapes, Plates, etc.)

Ryerson and Son, Inc., Joseph T.

Steel Grating (See Grating, Steel)

Steel Inclines (See Inclines, Steel)

Tanks (Sand-Settling)

Allen Cone and Machy. Corp.
Morrow Mfg. Co.
Smith Engineering Works

Tools (Drill) (See Drilling Accessories)

Tractors

Allis-Chalmers Mfg. Co.

Tramways (Aerial)

American Steel & Wire Co.

Transformers

Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery

Allis-Chalmers Mfg. Co.
Gruendler Crusher and Pulverizer Co.

Truck Cranes (See Cranes)

Tube Mills (See Mills—Ball, Tube, etc.)

Tube-Mill Liners (See Mill Liners and Linings)

Underground Loaders

Allis-Chalmers Mfg. Co.

Valves (Pump)

Manheim Mfg. and Belting Co.

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Chicago Perforating Co.
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Vibrating Screens (See Screens—Vibrating)

Washers (Sand, Gravel, and Stone)

Allen Cone and Machy Corp.
Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

Weighing Equipment (Automatic)

Schaffer Poidometer Co.

Welding Supplies

American Steel & Wire Co.

Well Drills (See Drills—Well)

Wheels (Car)

Iowa Mfg. Co.

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American Steel & Wire Co.

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Leschen and Sons Rope Co., A.
Williamsport Wire Rope Co.

Wire Rope

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Leschen and Sons Rope Co., A.
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Wire Rope Slings

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American Steel & Wire Co.

Worm Gears (See Gears and Pinions)

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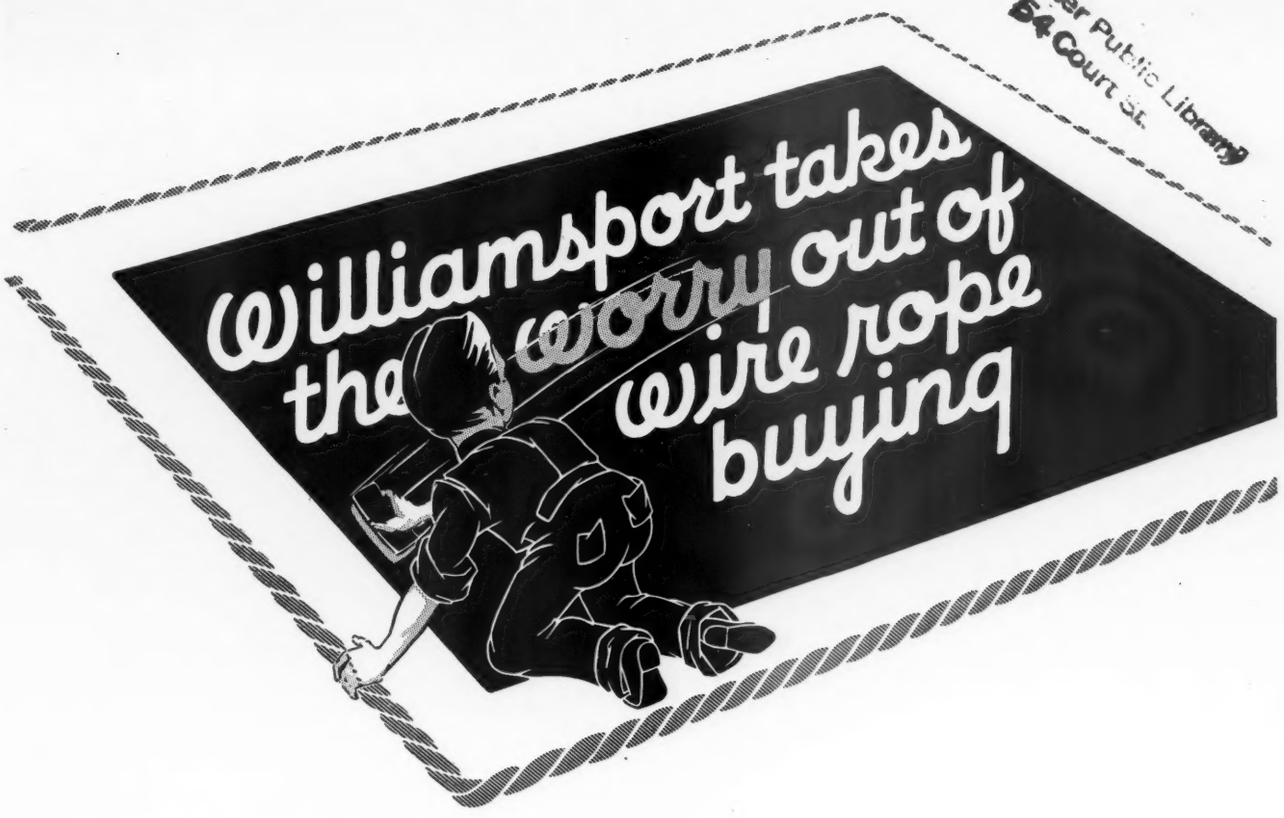

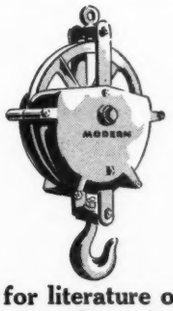

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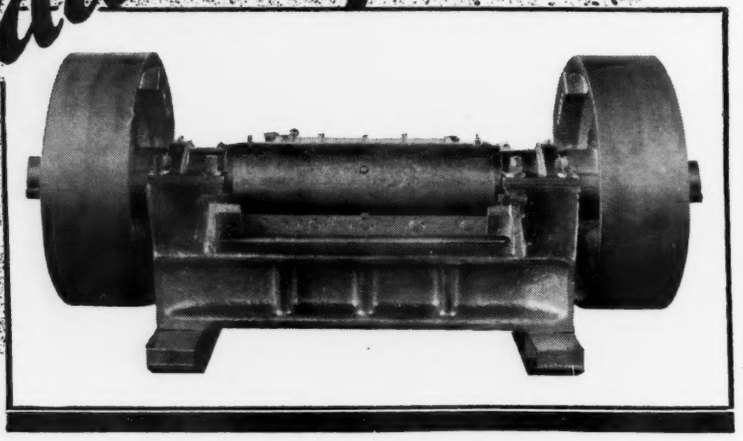

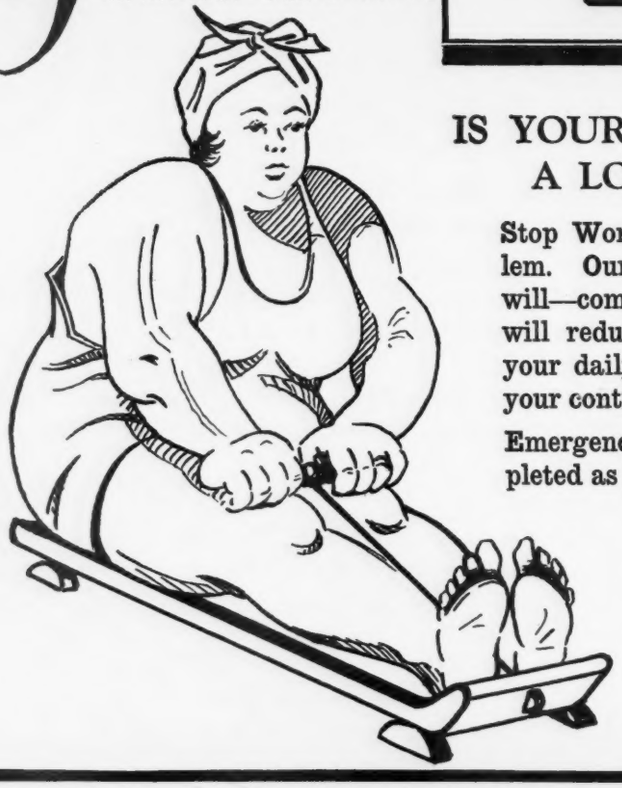

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VOLUME 25 NUMBER 1

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, OCTOBER 5, 1932

F. W. Kelley Dies at Albany at Age of 61

LEADER IN CEMENT INDUSTRY

Frederick W. Kelley, one of the outstanding figures in the Portland-cement industry, died September 19 at his home in Albany, N. Y., after a long illness. He was 61 years old and was president of the North American Cement Corp. and at one time head of the Portland Cement Assn.

Mr. Kelley was a native of Albany. He was graduated from Cornell University in 1893 with the degree of mechanical engineer. In his first position as a draftsman for the Consolidated Car Heating Co. of Albany, he rose to become general manager in the space of six years. In 1900 he went with the Helderberg Cement Co. of Albany, and became vice-president and general manager March 19, 1900. On April 18, 1914, he was elected president of the Helderberg company, which position he held until that firm and the Security Cement & Lime Co. of Maryland merged into North American Cement Corp. September 1, 1925, when he became President of the North American corporation, which position he held until his death.

Mr. Kelley was vice-president of the National Commercial Bank & Trust Co., trustee of the City Savings Bank, director of the Consolidated Car Heating Co., president of the Albany Hospital, trustee of the Albany Medical College, Albany Academy, Albany Institute of History & Art and of Dudley Observatory, member of board of governors of Union University, director of the Commercial Safe Deposit Corp., a member of the Fort Orange Club, and the Albany Country Club, a member of the American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society for Testing Materials, American Concrete Institute, Albany Society of Engineers, and Society of Engineers of Eastern New York. He was a former president of the Albany Chamber of Commerce, and the Society of Engineers of Eastern New York.

Besides his wife and mother, Mr. Kelley is survived by his daughter, Mrs. Arthur Brooks Harlow of Darien, Conn., his son Frederick W. Kelley, Jr., of Albany, and his sister Miss Edna W. Kelley of Huntington, N. Y. His residence was at 156 Chestnut St., Albany, and his summer home at Altamont, N. Y.

Frederick W. Kelley.

Start Operating Gravel Plant at Phoenix, Ariz.

Phoenix, Ariz., has a new sand-and-gravel producer—one of the first of such ventures to be launched at the Arizona capital in many years.

The new concern, the Phoenix Sand & Rock Co., has started operations at its new plant at Seventeenth St. and Broadway. H. H. Bandy and N. W. Axline are the owners and operators and five men are being employed. The investment in plant equipment is said to have been $30,000.

Opens Sandstone Quarry at Extinct Mining Town

A new sandstone quarry is being opened in Merced County, California, on the site of the "ghost" mining town of Gwinn.

A. A. Castro of Oakland, Cal., is in charge of operations.

To Make Temperature Studies of Concrete

DAM FAILURES PROMPT TEST

Instruments that will record temperature changes of .001 of a degree are being assembled at the University of California to make a series of elaborate tests on the concrete to be used in the Pine Canyon Dam, near the city of Pasadena.

Failures of mass concrete in huge dams in recent years have been studied for some time by research workers and it is believed that crumbling and cracking of the huge mass of concrete may be due to the cooling of the concrete at the interior of the mass. These massive concrete structures, two or three hundred feet thick at the base, retain the heat generated by the setting and hardening of the concrete for long periods, it is believed, and the resultant failure of several dams may be ascribed to that cause, scientists believe.

According to Samuel B. Morris, chief engineer of the Pasadena Water Department, under whose direction the Pine Canyon Dam is being built, the warm concrete must eventually cool to the mean annual temperature and it is this cooling which causes the stresses and strains which tend to rupture the entire mass, causing failure.

Special cements will be tested with the instruments to determine whether or not one can be developed that will not heat like ordinary Portland. Placing of concrete for the dam structure proper has not started as yet, although some of the diversion tunnels are now being concreted.

Higher Fluorspar Rates Effective in 3 States

Increased ex-river rates on fluorspar, in carloads, from various ports on the Ohio and Monongahela Rivers in Ohio, Pennsylvania and West Virginia to destinations in Ohio, Pennsylvania and West Virginia have gone into effect. The proposal of railroads to increase the rates was held justified by the Interstate Commerce Commission in a decision made public recently.

Another Potash Firm in Eddy County Field

HOLDINGS TOTAL 50,000 ACRES

The New Mexico Potash & Chemical Co., officered by New Mexico and Texas men, with associates in California, New York and the New England states, is opening development of 50,000 acres of land in the potash field in Eddy County, near Carlsbad, N. M.

An extensive drilling program has been begun designed to determine the richness of the deposits before shaft operations are started. The company now plans to reach a stage of production within a short time, as the financing work has been completed.

The operations are in charge of A. C. Nebeker, a mining engineer of wide experience. Headquarters have been established in Carlsbad. Prominent among the backers of the company are Col. George E. Montgomery of Amarillo, Col. W. G. Halthusen, formerly adjutant general of New Mexico, Hugh Williams, New Mexico corporation commissioner and former Governor Mechem of New Mexico.

The United States Potash Co., pioneer producer in the Eddy County field, is now mining potash and shipping it in large quantities after having spent more than a million dollars in development work and in building its refineries. The Santa Fe Railway has built a narrow-gauge line to the mill from the Pecos Valley branch of the railroad.

The field is said to be the only large one in the United States and superior to the potash found in Germany from which most of the world has previously obtained its supply.

Home-Building Revival Is Seen for Next Year

There are a number of factors pointing toward increased residential building in 1933, the F. W. Dodge Corp. points out.

The new Home Loan Bank System will start things moving in this direction, it is pointed out, and with improved employment, lower building costs, and a built-up demand for new housing apparent, the corporation believes that a revival of home building is almost certain to follow.

Overheated Shells Set Fire to Storage Bins

Fire caused damage estimated at $1,000 at the plant of the Pacific Portland Cement Co. at Redwood City, Cal., recently. The flames were confined to their source—one of the bins used to store oyster shells used in the manufacture of cement.

The blaze was caused, it is believed, by overheated shells which are dumped to the bins after they come from the driers.

Self-Liquidating Jobs Await Better Financing

More than $1,400,000,000 in self-liquidating construction projects have been approved in the various states, but have not been initiated because of inadequate financing. Most of this huge total can be started if the assistance of the Reconstruction Finance Corp. can be invoked.

MORE than five tons of explosives was exploded recently in the quarry of the Columbia Silica Co., just west of Akron, O., to bring down an estimated 31,275 tons of material. The stone is what is known locally as cement pebble consisting of silica sand and white pebbles closely set. Forty-five drill holes with an average depth of 45 ft. were loaded, and 2,500 ft. of Cordeau-Bickford fuse was used to detonate the charges. The explosive was divided as follows: 3,450 lb. of Burton 40 per cent. LF quarry gelatin and 6,900 lb. of Burton 40 per cent. LF ammonia dynamite. The shot was handled by W. O. Dunn, manager, technical service, and C. E. Akeroyd, of the sales department, Burton Explosives, Inc., of Cleveland, O.

News Briefs

Hersey Gravel Co., Hersey, Mich., awarded contract for paving 10½ miles with concrete on U. S. Highway No. 27 between Clare and Harrison, Mich., on its bid of $209,014.

* * *

All bids for cement to be used on Hetch Hetchy Dam are rejected as being too high by city of San Francisco, Cal.

* * *

Fourteen ranchers in Clayton Valley file separate dust-nuisance suits against Cowell Lime & Cement Co., Cowell, Cal.

* * *

Six-acre gravel deposits acquired by Ionia county highway commission near Ionia, Mich., where plant and pit are to be opened shortly.

* * *

Options on limestone deposits taken up near Bedford, Ind., by Wallace Stone Co., Elletsville, Ind., and Ingalls Stone Co. of Bedford.

* * *

New gravel pit opened north of Toledo, O., by Tama County Commissioners to supply materials for resurfacing roads.

* * *

Biesanz Stone Co. moves main offices from downtown Winona, Minn., to plant, where modern office building has been erected.

* * *

Commercial Lime Co., of Ocala, Fla., reöpens lime plant idle for several months.

Cement Men in Chicago District Report Gains

Cement shipments are holding up very well, according to the Chicago building materials market. Optimism continues to expand and the feeling is that a real turn for the better can be expected from now on.

Highway business is satisfactory. Country districts are taking cement and sand, stone and gravel for road work in a volume considered encouraging. Many states are engaged in improvement projects calling for solid foundations.

Cement men are cheered over appropriations by the government for locks and dams on the upper Mississippi River. Extensive work is also to be started on bank stabilization of the lower end of the Mississippi. Improvements call for substantial tonnages of materials.

Texas Gravel Producer Gets Levee-Repair Job

The Havana Gravel Co. of Mission, Tex., has been awarded a contract for rebuilding and improving flood-protection levees near Hidalgo, Tex.

The company plans to start work shortly.

Highway and Building Congress Notes

Three more organizations have signified their intentions of participating in the Highway and Building Congress to be held January 16 to 20, 1932 at Detroit, Mich. These are the American Society of Municipal Engineers, the Steel Founders Society of America, Inc., and the American Institute of Steel Construction. This brings the total of the participating organizations to 14. There were 10 when the Congress was first announced.

The Ready Mixed Concrete Assn. will hold its one-day convention on Wednesday, January 18, at the Book-Cadillac Hotel. This was definitely announced recently by V. P. Ahearn, executive secretary.

Opposition to the diversion of gasoline-tax and vehicle-license funds is growing every day and by the time the Congress gathers considerable organized sentiment will have been revealed. One of the most recent formations is that of the Illinois Highway Users' Conference, a statewide organization which intends to fight diversions to the limit. F. E. Ertsman, secretary of the Illinois Motor Truck Owners' Assn. is in charge of activities.

Edison Interests Work Out Plans for New Mill

According to W. D. Cloos, vice-president and general manager of the Edison Cement Corp., funds for the completion of the cement plant at New Brunswick, N. J., should be forthcoming within the next few months. The plant, formerly a potash operation, is located on the Raritan River and will be operated, when completed, by the Metropolitan Cement Corp., New York, N. Y., in which the Edison interests hold control.

Since acquiring the property, the company has been busy making a detailed study of the facilities so that the design of the plant will utilize as much of the present layout and equipment as possible.

Temporary Plants Must Employ All Hand Labor

Hand-labor provisions of the Government's Relief Bill apply specifically to temporary road-side aggregates plants rather than to established operations, according to informal constructions of the law by the U. S. Bureau of Public Roads.

Such plants as spring up solely to provide materials for use in emergency road-building will be forced to strict observance of the law in respect to hand labor, minimum wage scales, etc.

Established plants which provide aggregates to be used on roads built under the emergency appropriation of $120,000,000 are expected to comply with the spirit of the law in the utilization and compensation of labor, but not necessarily in replacing machinery with manual labor.

Cement Barges Busy at New Illinois Terminal

Shipments of bulk cement by barge from the Peru, Ill., loading terminal of the Marquette Cement Mfg. Co., are being made with frequency and dispatch, following the opening of the new facilities a few weeks ago.

Cement is carried by special hopper cars from the company's plant at Oglesby, seven miles distant. The cement is discharged to a hopper where it is elevated to the loading tower by bucket elevators. From the top of the tower, a 12-in. screw conveyor carries it over the railway yards to the barge dock on the Illinois River, where it is chuted by a marine leg to the holds of the barges.

County to Put Farmers at Work Hauling Gravel

Gravel used in building and maintaining highways in Boone County, Indiana, will be hauled by wagons and teams hired from farmers instead of the customary method of using motor trucks, according to a decree issued by the commissioners of that county.

The decision was reached after 136 farmers had petitioned the board, declaring they were entitled to the work on account of their inability to earn a living raising crops at present market prices.

Birmingham Tile Plant Operating at Capacity

The Birmingham, Ala., plant of the Federal-American Cement Tile Co. is working on a full-time basis handling roofing contracts for postoffice buildings at Atlanta, Ga.; Montgomery, Ala.; Greensboro, N. C.; High Point, N. C.; Meridian, Miss., and Knoxville, Tenn. R. O. Prichard, assistant superintendent of the Hammond, Ind., plant, is temporarily in charge of the Birmingham operations.

National Park Grading Award to Portland Firm

Contract for the grading of approximately five miles of highway through the southeastern part of Rainier National Park has been awarded the Portland Gravel Co. of Portland, Ore., by the United States Bureau of Public Roads.

The company's bid of $136,037 was next to the lowest but it won the contract after the low bidder failed to qualify.

★ Meeting Competition by *Beating It!*

Items in this column marked with a star call attention to those alert producers who are awake to the arrival of an era of good business and who are expressing their faith in the future by buying and installing their needed equipment now.

★ W. F. Nothacker, sales manager, Sanderson Cyclone Drill Co., Orrville, O., reports the sale of a large blast-hole drill to the Charles Stone Co., Mt. Vernon, Ill. The drill cost $2,600 and is to be used at the company's quarry at Cyprewss, Ill. The stone company is said to have orders on hand for six months' operation on a 24-hr. daily basis and the new drill was ordered to enable it to keep up with production requirements.

* * *

★ Asana Portland Cement Co. recently ordered a set of Oliver filters for one of the two kilns at its Mishitama plant in Japan. This kiln, 197 ft. long, now has a capacity of 1,800 bbl. per day and the new filter installation is expected to increase this to 2,100 bbl., plus lower fuel costs and a higher quality product. The purchase follows a recent trip to this country of K. Fuju, chief engineer, and S. Takeda, chief chemist of Asano. They inspected a number of cement plants here, especially those which were using filters.

* * *

★ A Hardinge 8-ft. by 48-in. conical scrubber has recently been installed at the Sampsel plant, near Chillicothe, Mo., of the Cooley Gravel Co., making salable material from what formerly was waste. The installation rounds out a program of improvement which has been going on all summer at the plant.

* * *

★ A short-head Symons cone crusher has been installed at the new silica and feldspar-grinding plant of Consolidated Feldspar Co. at Kingman, Ariz.

* * *

★ The Brown-Rosenbarger Gravel Co. recently began operating its new sand-and-gravel plant near Syracuse, Ind. Included in the equipment is one of the new log washers recently introduced by Eagle Iron Works.

* * *

★ A portable sand-and-gravel plant, built by the Universal Crusher Co., has been installed at Seehorn, Ill., by Missouri Gravel Co., subsidiary of Moline Consumers Co., Moline, Ill. Its capacity is 50 tons per hr. and supplements production of the company's permanent plant at LaGrange, Mo.

Editorial

The Prospects for Business

THE reports of business conditions in our industries brought back by editorial-staff members who have recently made trade studies in representative parts of the country confirm the impressions gained by a review of letters received from producers during the last few months. In most places from which reports have been received by either of the methods named business has taken a definite turn for the better. In some localities this change occurred nearly three months ago, in others it is a matter of the last few weeks. This spottiness is found, too, among producers in the same district. There are plenty of examples showing that although some concerns in a given territory have already experienced a marked improvement, others have seen little evidence of betterment, while still others find their business worse than it has been. There are quite a number of producers who have been operating on regular full-time schedules for several months, many more have recently been able to reopen their plants after prolonged inactivity, and a great many more are about to increase their operations on account of orders placed within the last two or three weeks. In many instances there remains a doubt, however, as to whether the gains already experienced are the beginning of a lasting improvement or merely more of those slight upward turns which many industries have seen at various times during the last few years. Several producers who have already seen a considerable upturn in their sales say that they believe the advance marks a permanent trend, not only because it is more prolonged than previous signs of betterment but also because there are other characteristics which distinguish it from some brief spurts of better business that have gone before.

With this improvement in business has come a demand for better producing facilities, in a few cases to increase production but almost always to improve the equipment so as to reduce operating costs or to make a different type of product. Changes in the specifications covering material for highway uses have necessitated changes in producing equipment to enable producers to furnish material of different characteristics. The demands for closer adherence to size requirements and for cleaner materials have resulted in the purchase of new screening and washing equipment. Instances of this kind of plant improvement have been increasing in number in recent weeks and, if complete data were available, they would undoubtedly show a rising rate of increase throughout the period.

In the cement section of our industries—a division that has been the cause of much discouragement to both cement manufacturers and the makers of cement-making machinery—the improvement in *morâle* which has been observed lately is more the result of a restoration of psychic strength than of a revival of business. One maker of quite expensive cement-mill equipment has booked two orders which are to be completed before the middle of November and he reports that of six other jobs on which estimates have recently been submitted four are to be acted upon between now and the first of next year. Another equipment manufacturer reports that a well-known but antiquated cement plant is to undergo a most thorough overhauling in the very near future, the changes requiring a revolution in the process of manufacture and consequently involving a considerable investment.

From the sand-and-gravel and crushed-stone branches of our industries have come, as would be expected, more encouraging reports. There have recently been numerous reports of remodeling—in several cases quite extensive remodeling—and a few examples of the building of new plants to take the place of older and less efficient ones. As has been said, screening and washing facilities are being subjected to close scrutiny and are being renovated or revised to meet modern demands, and similar changes are being made in crushing operations, not only in stone plants but also in gravel plants where the need has been found. The fact that three plants have lately installed dust-collecting equipment is evidence of a willingness and an ability to buy machinery that is still too often looked upon as a semi-luxury.

The present upward turn in business in our industries was foreshadowed by numerous indications that began to be evident in the spring, but while these signs were just a little more convincing than those that had gone before, they were still too similar to justify action on the part of these industries as a whole. They gave some ground for encouragement, they gave new life to jaded hopes, but the gains were almost solely in *morâle*. The last three months have witnessed a betterment that is physical as well as psychic. The accumulating weight of evidence did much to dispel producers' graver doubts, and increasing courage seemed justified by scattered improvements in the amount of business transacted. Within recent months these isolated cases have been talked about more and more, they have encouraged others to take a more healthy view of conditions, and the results are evident in the increasing orders for new equipment from all sections of the field.

The revival that has set in gives no cause for hilarious jubilation; it gives no indications of a coming boom; it holds no promise of easy money for inferior products made by slip-shod methods to pass superficial inspection. It has none of these characteristics. Properly appraised, it shows a wholesome upturn for those who are equipped to meet specifications, to produce cheaply and efficiently, and to obtain profitable prices for their

products. The fact that the renovating and improvement of production facilities sometimes requires heavy investment is bringing to the minds of increasing numbers of producers a realization of the fact that prices must be high enough to leave a profit and that the success of a business can not be measured only by the volume of its product.

Transportation Habits Change

A RECENT report from Michigan records the abandonment of the last important electric interurban railway in that state. This was the one connecting two great industrial centers, Detroit and Toledo, and serving a territory which, in the heyday of electric-railway operation, was considered and indeed proved to be a bonanza. But times change and with them habits and ideals. A method which in its day caused endless worry to steam-railroad operators in turn succumbs to the advance of yet superior means, highway transportation. This is the drama of industrial evolution.

Electric railways became prominent factors in interurban transportation in the late 'nineties and from that time forward their development was rapid and extensive. Speed, frequency of service, cleanliness and a growing public sense of the importance and wonders of electricity combined to favor the new method. Electric railways often paralleled existing steam-railway lines and caused the latter considerable loss of revenue; in other cases they blazed new trails across unserved territory and so created new business. For certain purposes they provided the best form of transportation then known and their vogue lasted more than three decades.

Their virtual disappearance from the Michigan scene, where they played an important economic part in the development of the state's industries, is but a sign of the times. For years the profits of electric railways have been threatened, impaired, and in many cases destroyed by the competition of superior means—the private and common-carrier motor-vehicles operating on public highways. Having received, even at the height of their development, relatively little freight business, they were compelled to live largely if not entirely from passenger revenue; so the increasing use of motor vehicles for passenger travel cut into their incomes at a vital spot. Furthermore, what little less-than-carload freight business they received was in time diverted to motor-trucks using the highways, so that the prospects for profit-making became each year less and less promising. At present there appears to be no hope for a revival of electric interurban railway travel comparable to that of fifteen or twenty years ago. Most of the business then given to that type of service has since been taken over by highway-transport vehicles, where it will remain until some service superior to highway travel may be devised.

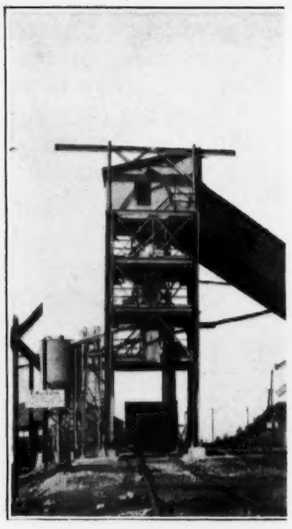
Steam railways have been experiencing much the same type of revenue loss through the diversion of large percentages of passenger travel to the highways. Freight traffic, of which they still control the major part, is turning to highways, too, especially in those cases where the economy or convenience of highway shipment is a striking or important factor. In both cases—electric railways and steam railways—the same principle of survival is demonstrated: outmoded means give way to newer and better ones, regardless of the time, money or intelligence that may have been invested in them and despite the extent and duration of their one-time popularity.

In the matter of intercity transport of persons and goods our highways are demonstrating their fitness to survive the vicissitudes of fortune and the fickleness of public taste. They provide quick, comfortable, clean and flexible transportation for people and rapid, direct and controllable transport for goods, and in so doing they are demonstrating their superiority to the railroads for certain types of service. Furthermore, they hold immense potentialities for the further development of their use, through improvements in the roadways themselves and in the vehicles that use them. They afford a degree of flexibility, a directness, a freedom from transfers, and an adaptability to new uses which are outside the scope of any type of fixed transportation.

There are possibly not more than two conceivable directions in which intercity highway transport may become obsolete. One is the possible development of the use of airways, the other the possible development of means of long-distance communication and vision which will greatly reduce the need for physical transport, at least of persons. One of these possibilities is already upon us, although its potentialities have been only slightly unfolded; the other is, as a practical development, even more remote. Highway transport has earned its cost and present vogue by the superiority of the service it provides and it will retain its present patronage and will continue to justify its cost as long as it continues to provide the same degree of superiority. Its present superiority over other common forms of transport is likely not only to continue for a long time but to grow considerably as the traffic-bearing capacity of the highways increases and as the speed, capacity, and economy of the motor-vehicle are enhanced.

However, even such important truths are not in themselves enough to protect highway transport from the attacks leveled at it by the railroads. Twice within a recent week railroad executives have assailed what they are pleased to call "subsidized transport," the term now applied to transport on the highways and in the air. These competitors of the railroads are attacked because they invade what the railroads consider their rightful domain, not because they are unreliable or uneconomical. They threaten and have already badly shaken the traditional supremacy of a form of transportation that in some branches of its service has already become obsolete. The railroads realize this only too clearly and this realization is at the root of their campaign of retaliation.

Unusual Methods Employed in Limestone Mine Operated by Birmingham Steel Producer



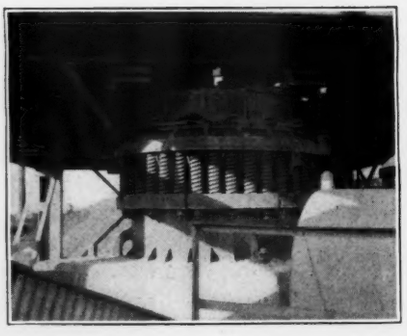
Muscoda plant and

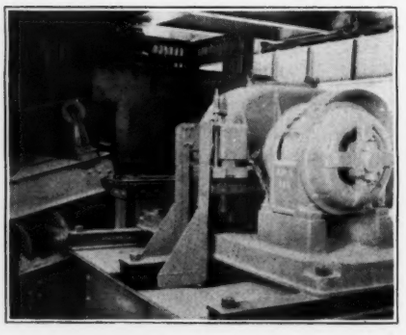
By W. E. TRAUFFER

MOST of the important new crushed-stone plants producing stone for commercial use are given wide publicity soon after they go into operation and are carefully studied by other operators who are always on the alert for more efficient and economical methods of operation. Such publicity is of great benefit to the crushed-stone industry as a whole as it encourages progress which is one of the vital necessities in any industry. Occasionally, however, new plants are built for other than commercial purposes and, although they often contain much of interest to other operators, they receive little publicity.

This is the case with the two new plants of the Tennessee Coal, Iron & R. R. Co., Birmingham, Ala., which were built within the past several years to supply lime and flux for the company's extensive open-hearth and blast-furnace operations in and around that city. All their product is consumed by the company and none is sold on the market in competition with other crushed-stone plants. One of these plants is a limestone-mining operation at Muscoda and the other a dolomite quarry at Dolonah. Both plants are simple in design and consequently economical to operate. This simplicity is, of course, partly due to the fact that only a few standard sizes are produced to meet the company's needs. All operations are permanent, all buildings being of steel and concrete throughout. This article describes in detail the operations at Muscoda which are featured by an unusual and interesting limestone mine whose development and operation are of interest to every mine and quarry operator. A complete description of the Dolonah operations will follow in an early issue.

The new limestone mine at Muscoda, which is 1 mi. southeast of Bessemer, Ala., takes the place of the old Vann quarry near Trussville which first went into operation in 1907. A new screening-and-washing plant was erected there in 1922 and was operated steadily until 1931. Because of a high percentage of waste material which made it necessary to select the stone and load it by hand and because of the high transportation cost, the cost of the stone from the Vann quarry became excessive. When the new plant at Muscoda went into operation in April, 1931, the old plant was abandoned and dismantled. The new plant has a capacity of 130 tons per hr.





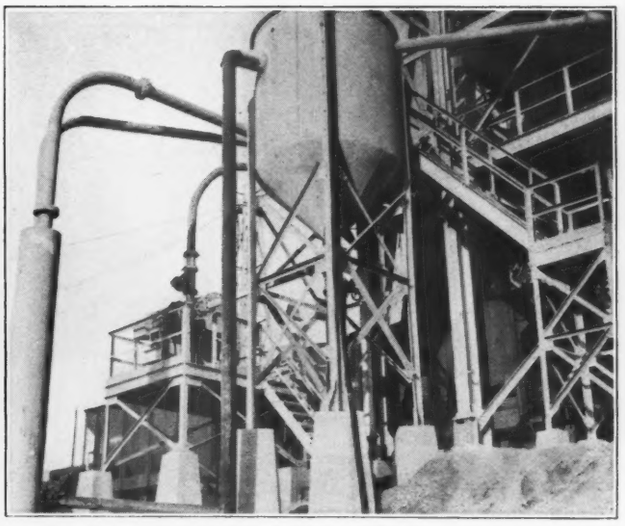
Right—The secondary cone-crusher. *Below*—Drilling in one of the back stopes from top of muck pile. *Extreme right* — Speed-reducer, magnetic separator and automatic brake on main conveyor.

The limestone at Muscoda is the same as that at Vann, being the Fort Payne limestone of the Mississippian age. An average analysis of the stone as shipped is given below:

	Silica	Fe_2O_3	Alumina and $CaCO_3$	$MgCO_3$
Lump	.73%	.37%	98.28%	.12%
Crushed ...	1.18	.51	97.69	.12

Two sizes of stone are produced at Muscoda. The lump stone, 2-in. to 8-in., is used for charging the

tipple of the Tennessee Coal, Iron & R. R. Co.

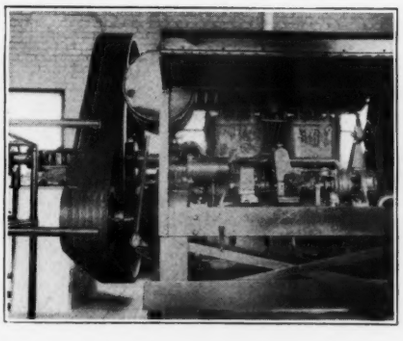


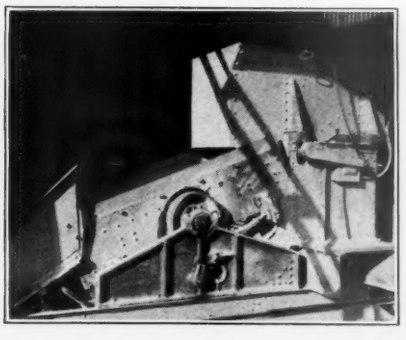
Sand tank at washing plant. Pump at rear.

open-hearth steel plant at Fairfield. The .063-in. to 1⅜-in. stone is shipped to the company's lime-burning plant at the Ensley steel plant, where it is calcined and used for lime charge of the open-hearth furnaces where the duplex process is used.

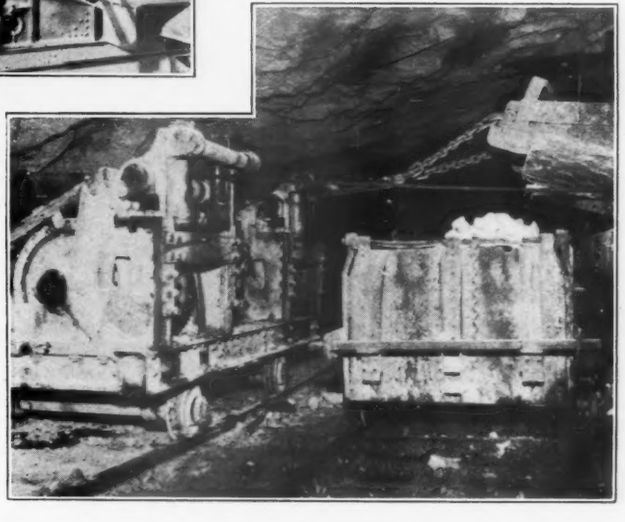
The mine at Muscoda is operated in a limestone stratum lying about 330 ft. above the iron-ore seam which supplies the company's blast furnaces. The stratum of high-grade crystalline limestone varies from 40 to 55 ft. in thickness. The slope of ore mine No. 5, now temporarily abandoned, is used in connection with this development. Both the ore-seam and the limestone stratum have a dip of about 17 deg. A material- and manway was raised from the ore slope at an angle of 36 deg. 30 min. with the horizontal to intersect the limestone stratum above. From the point of intersection a 10-ft. by 20-ft. slope was raised in the lower portion of the limestone stratum for a distance of about 800 ft. Meanwhile ventilation and rope raises from the ore seam to the limestone stratum were raised simultaneously with the material-way.

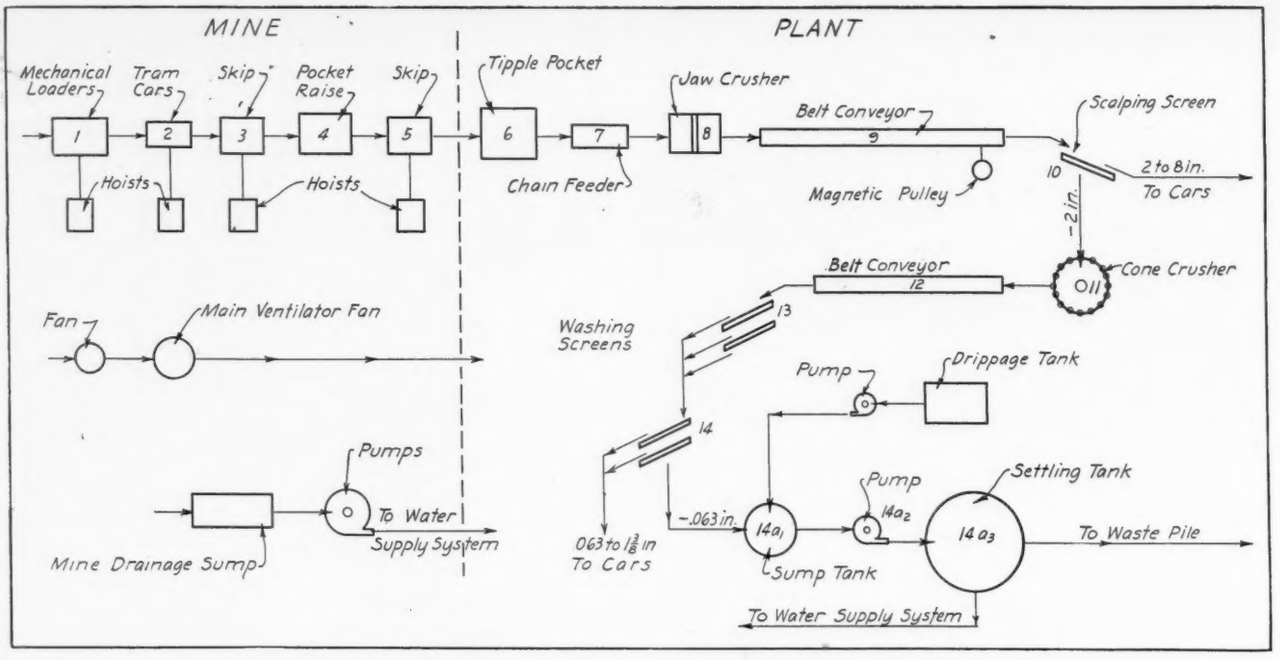
The location of this original rope raise was selected to come below the zone of weathering of the rock formation, approximately 2,000 ft. horizontally from the outcrop of the iron-ore seam and with a depth of cover at this point of 400 ft. It developed, however, that their intersection came at the edge of the weathered zone and water was encountered. A flow of 500 gal. per min. soon developed and work was stopped on both the raises and the limestone slope. Attempts were made to stop the flow of water by drilling numerous holes radiating from the stone slope and injecting cement grout into this section by pressure. After 27,000 sacks of cement had been used for this purpose it was found that this section was too weathered to allow further driving of the rope raise with a probable inflow of large quantities of water and mud. Both this raise and the stone slope were then cemented off from the weathered stone to prevent further seepage—the seepage was reduced to 20 gal. per min.—and the former was abandoned entirely. It was then decided to place the auxiliary hoist in the limestone slope, instead of the ore slope as originally planned, and a new pocket raise was driven. The original pocket raise is now used for ventilation. Both the present raises are at an angle of 60 deg. with the horizontal. The face of the limestone slope is now about 500 ft. below the surface of the ground





Left—Vibrating screen which feeds the secondary crusher. *Below*—Movable scraper loading from stope to mine car. *Extreme Left*—Auxiliary gasoline engine drive of mine ventilating fan.





Flow-sheet of mining and processing at the Muscoda operations.

and 150 ft. above sea-level. For a distance of 210 ft. from its portal the ore slope is lined with reinforced concrete.

Four pairs of mining levels were turned off at right angles from the limestone slope at intervals of 200 ft. These levels are being driven 20 ft. wide and 12 ft. high and on a grade of 1½ per cent. in favor of the loads. The faces of these levels as well as the stopes are advanced by means of the mechanical loading equipment described below. The stopes are turned off the mining levels on 70-ft. centers and are broken to a width of 12 ft. and a height of 12 ft.

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE TENNESSEE COAL, IRON & RAILROAD CO. PLANT AT MUSCODA, ALA.

(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key	Equipment	Size, Capacity or Type	Power Source	Power Transmission
Mining	1	Mechanical loaders (8)	1½-cu.yd.	50-hp. motors (8)	Hoists and cables
	2	Tram cars (8)	3¾-ton		Hoist and cable
	3	Skips (2)	3¾-ton		
		Skip hoist (underground)	Double-drum	300-hp. motor	Cable
	4	Pocket raise			
Haulage to plant	5	Skip	10-ton		
		Skip hoist (surface)	Single-drum	1,800-hp. motor	Cable
Primary crushing	6	Tipple pocket	125-ton, steel		
	7	Feeder	130-ton per hr.	10-hp. variable speed motor	Speed-reducer, gear and chain
	8	Jaw crusher	40-in. by 48-in.	200-hp. motor	Multiple V-belt
	9	Belt-conveyor	36-in., 91-ft. centers	25-hp. motor	Speed-reducer
		Magnetic pulley	30-in.		
Scalping	10	Screen (Oversize, 2-in. to 8-in., to cars; throughs to 11)	4-ft. by 8½-ft. single-deck	10-hp. motor	Multiple V-belt
Secondary crushing	11	Cone crusher	5½-ft.	150-hp. motor	Multiple V-belt
	12	Belt-conveyor	24-in., 99-ft. centers	15-hp. motor	Speed-reducer
Fine-material washing	13	Washing screen	4-ft. by 8½-ft. double-deck	5-hp. motor	Multiple V-belt
	14	Washing screen (Oversize and top-deck throughs, .063-in. to 1⅜-in., to cars; bottom-deck throughs to 14a)	4-ft. by 8½-ft. double-deck	5-hp. motor	Multiple V-belt
Waste-material handling	$14a_1$	Tailings sump tank	3,300-gal. conical-bottom, steel		
	$14a_2$	Sand pump	4-in. centrifugal	50-hp. motor	Multiple V-belt
	$14a_3$	Settling tank (Overflow to water-supply)	90,000-gal., steel		
Drippage handling		(From washing screens)			
		Sump tank			
		Pump (To $14a_1$)			
Mine ventilation		Fans (8)	2,800-cu. ft. per min.	5-hp. motors (8)	Direct
		Main fan	3½-ft. by 8-ft. diameter, 125,000-cu. ft. per min.	125-hp. motor (or, in emergencies, 80-hp. gasoline engine)	Multiple V-belt
Mine drainage		(From mine) Sump			
		Pumps (2) (To water-supply)	1,750-gal. per min., centrifugal		

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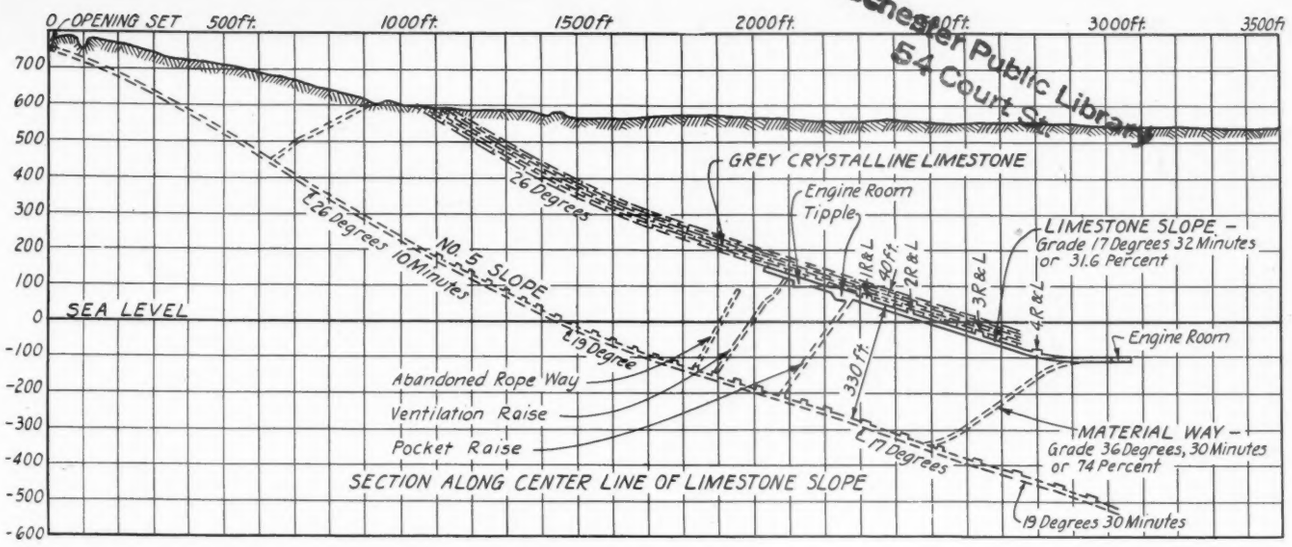
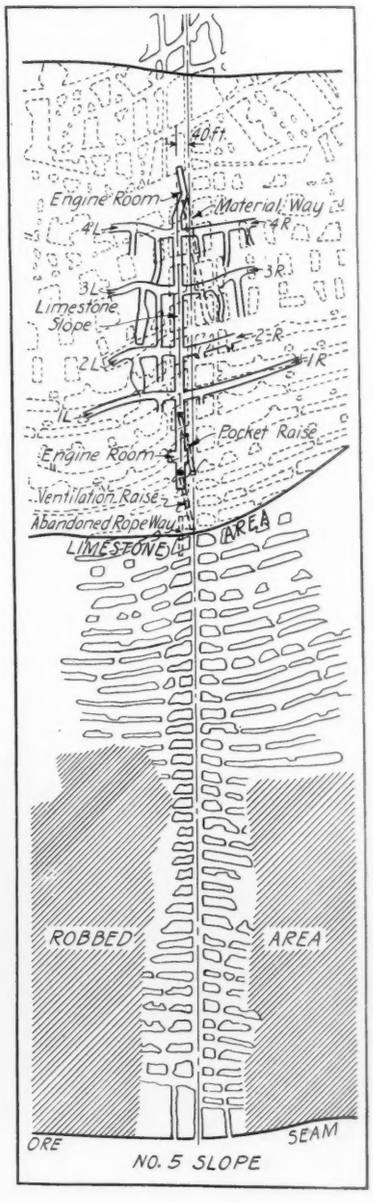
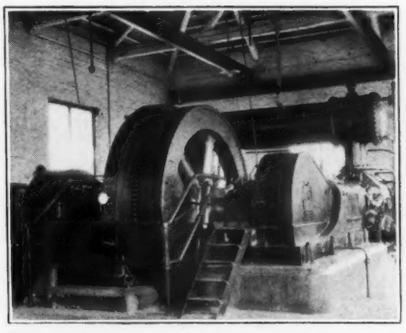


Cross-section of the mining operations with opening at extreme left. Below is a plan of the old iron-ore workings and present limestone mining operations.

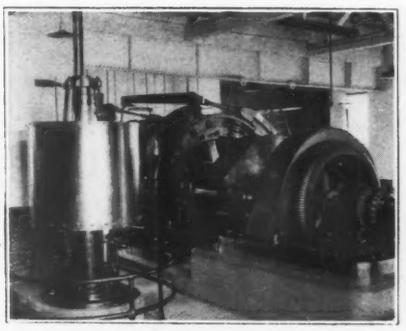
A loading ramp is constructed at each of these openings and when the face of the stope has advanced 20 ft. from the upper rib of the levels it is widened to 20 ft. and driven at this width to within 15 ft. of the level above, when it is narrowed down to 8 ft. which width is maintained for the remaining distance. This break-through ventilates the stope. Beginning at the point where the stope was narrowed for the break-through, 5 ft. is slabbed from each rib, retreating to within 20 ft. of the loading ramp. As the levels are driven in the bottom of the limestone stratum, there remains approximately 30 ft. of stone above the top of the stope. This is removed by starting a cut in the hanging wall at the lower end of the stope and leaving sufficient broken stone on the footwall to work upon, so that this cut may be widened and successive cuts deepened until the hanging wall of the limestone is reached.



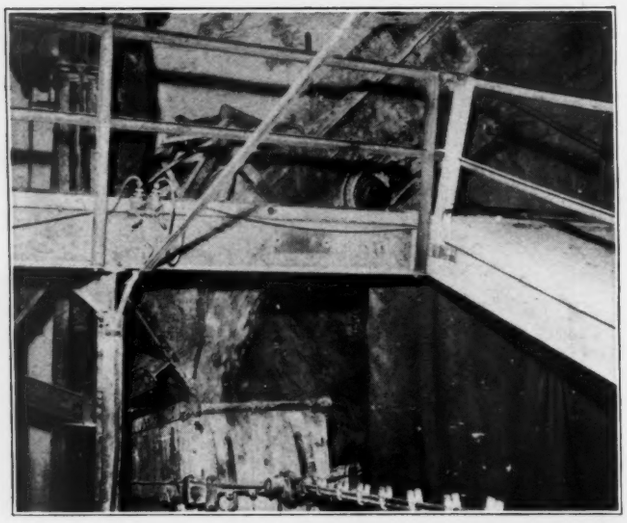
This results in an inverted bench effect, the benches being approximately 10 ft. in height and a similar distance in width. These benches are shot off from bottom to top and advancing towards the upper end of the stope by drilling holes at right angles to the stratum. There is always sufficient broken stone left on the footwall to facilitate drilling and quarrying without having to construct wooden stages. When the drilling and shooting operation is complete, all the broken material is removed. As soon as the next stope toward the face is broken through to the level above, a stopping is placed at the upper end of the worked-out stope with a small regulator so that the ventilation may be advanced and if the stope is making any gas it can find an outlet through the regulator. The stopes and faces of the levels are advanced by using a center-cut system of drilling. All holes, with the exception of pilot



Air compressor in the power-house. Its capacity is 5,200 cu. ft. per min.



Main skip-hoist, with accumulator for releasing hydraulic brakes in foreground.



Mine car discharging stone to skip car in limestone slope.

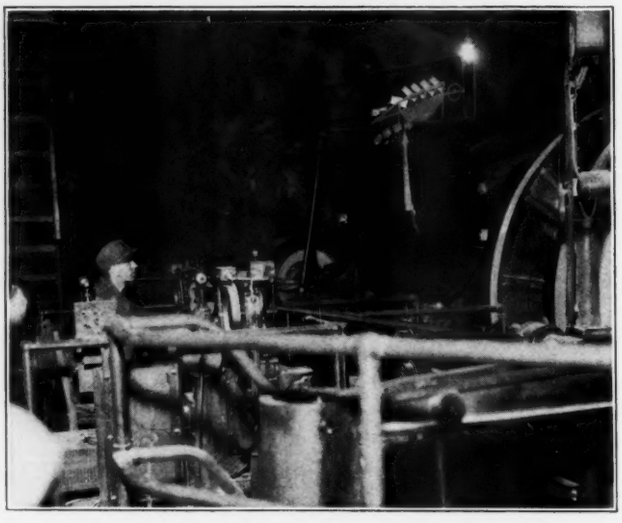
holes, are bottomed with a 10-ft. steel. These pilot holes are drilled to ascertain the possibility of water and are kept 20 ft. ahead of the face to be shot.

The present development will supply enough stone for many years of operation. Later the limestone slope will be further extended.

The stone is loaded by 8 mechanical loaders of the company's own design into 3.75-ton standard-gage steel tram cars. Each loader is on rails and has a double-drum hoist which operates a scraper bucket which is also original in design. Each loader is driven by a 50-hp. 250-volt, direct-current motor and has a contactor control replacing the drum-type controllers formerly used. Each bucket has a capacity of about 1½ cu.yd. and discharges over a loading ramp into the tram cars. These cars are also made by the company and have roller-bearings. The cars run by gravity to the limestone slope, where they discharge from above into two 3.75-ton skips, which are also of the company's own design. They are fitted with roller-bearings and are operated by a 300-hp. double-drum hoist having magnetic control. This hoist is located above the pocket-raise opening in an enlarged section of the limestone slope called the engine-room. The skips dump at a double-track steel tipple into the pocket raise, which is closed at the ore slope below by a heavy steel air-controlled undercut gate set in concrete. Stone is fed through this gate into a heavy steel measuring pocket in the concrete-walled loading chamber. The operator fills this pocket to a level which he knows provides just enough material to fill the main skip. The gates in this pocket are tripped by a small air cylinder which allows quick discharge to the skip. When the pocket is empty, counterweights close the gate for another load.

The standard-gage skip of the company's own make has a capacity of 10 tons and is fitted with roller-bearings. It makes a round trip between the pocket raise and the plant tipple, a distance of 2,400 ft. each way, in 3 min.

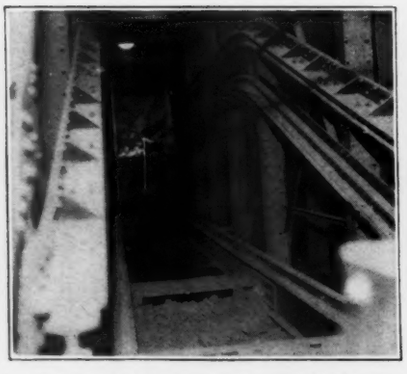
Any seepage water in the limestone mine drains to the bottom of the limestone slope. Two 3-stage



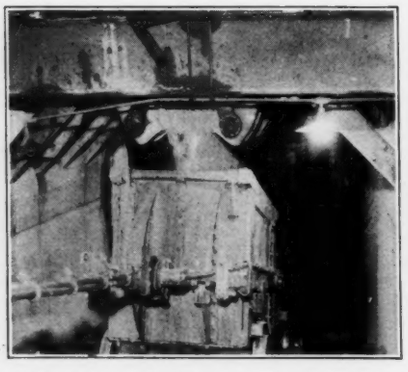
Operator at double-drum hoist in limestone slope.

centrifugal pumps, operated in relay and having a capacity of 1,750 gal. per min., keep the mine dry. Materials and supplies are brought into the mine on a special larry, which is lowered past the pocket raise to the material-way, where it is transferred to the material raise and thence to the limestone slope. Workmen enter and leave the mine in the same manner. The material hoist is driven by a 125-hp. motor provided with magnetic control.

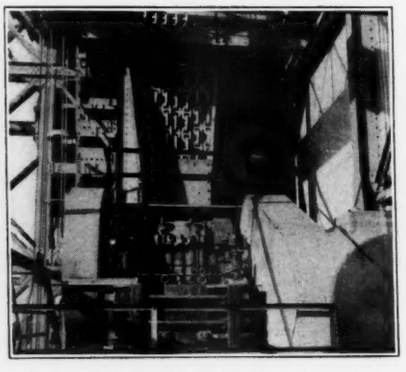
The 125-ton steel tipple pocket is flat-bottomed and is lined with rails to take up the shock of the stone falling from the skip. The material forms its own hopper in the bottom of the pocket. A chain



Skip car in limestone slope tipple discharging to pocket raise.



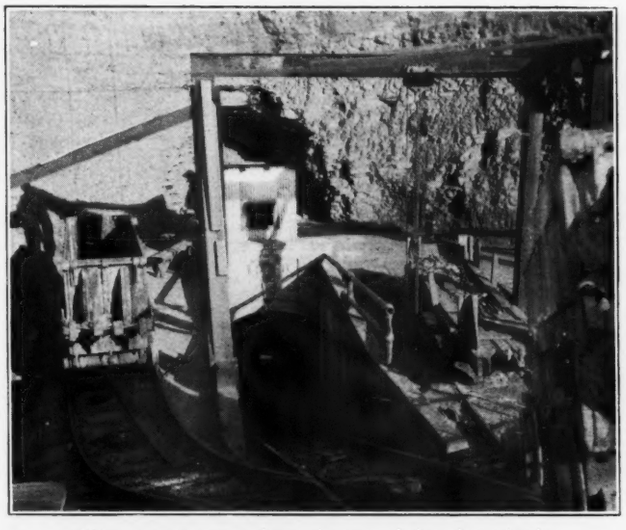
Main skip car loading in ore slope from measuring pocket.



Close view of the chain feeder at the primary jaw crusher.

feeder carries it from the pocket to the 40-in. by 48-in. all-steel primary jaw crusher. This is set to produce an 8-in. product which is chuted to a 36-in. inclined belt-conveyor set on 91-ft. centers. A chain-drag in this chute breaks the force of impact of the stone as it falls on the conveyor. A 30-in.-diameter magnetic head-pulley on this conveyor removes any tramp or other iron present in the stone and diverts it to a pile. This conveyor discharges to a 4-ft. by 8-ft. 6-in. vibrating scalping screen which has 2-in. openings. The material over 2 in. in size is chuted directly to railroad cars on a siding alongside the plant for shipment to the company's open-hearth-steel plant. This chute is also of original design and has an air-operated gate which breaks the speed of flow of the stone to the cars and reduces breakage. The chute has sufficient capacity so that when one car is full, the gate can be closed and another car "spotted" without spilling stone or shutting down the plant.

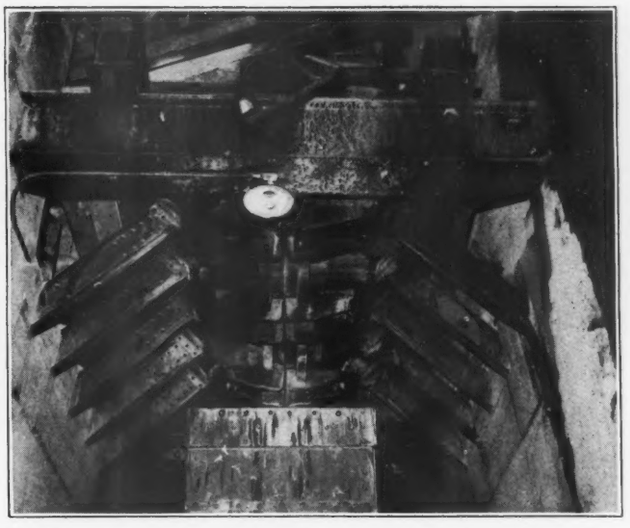
The material under 2 in. in size coming from the scalping screen goes by gravity to a 5½-ft. cone crusher set at 1⅛-in. opening. This discharges to a 24-in. inclined belt-conveyor which operates on 99-ft. centers and leads to the washing plant. This conveyor spans the main-line track to the No. 6 ore mine, and discharges to a 4-ft. by 8-ft. 6-in. double-deck vibrating screen which has 1¼-in. and ¾-in.



Mine opening seen from the top of the plant tipple.

openings on its top and bottom decks respectively. The three sizes produced are fed together to a second screen which is of the same size and make and has ¼-in. and .063-in. openings.

The separations made by these two screens are intended only to remove the fines and at the same time give the material a thorough washing, which is done by a series of sprays on the screens. The large sizes from the last screen are chuted together into cars on a loading track under the building. This chute is split to discharge through two spouts into a car. A flap-gate controls the flow of stone so that after a car is full the flow can be diverted to the other spout and into the next car while the full car is being taken away and the empty one



Looking up at discharge gates of measuring pocket under pocket raise. Skip car in ore slope below waiting to be loaded.

"spotted." This arrangement allows continuous loading without spillage. This stone is shipped to the company's lime plant and furnishes calcined lime for the open-hearth process.

The fine material passing through the bottom deck of the second washing screen is flumed with the wash-water to a conical-bottomed tailings sump-tank. A 4-in. sand pump forces it from this tank to a 90,000-gal. conical steel settling tank in a clearing 500 ft. distant. This tank is at an elevation sufficient to allow the clear-water overflow to return by gravity to the washing system for reüse. The tailings from the settling tank go to a waste-pile. Drippage from the washer building and cars goes through a concrete sluice to a small steel tank, from which an automatically-controlled pump feeds it whenever the tank becomes full to the conical tank at the plant, whence it goes with the fines and wash-water to the settling tank.

The plant was designed by the engineering department of the company and was built and the

The tipple and part of the plant.

equipment installed under its direction. It is of steel construction throughout and has concrete foundations and crusher footings. Steel-plate floors and stair treads are used, and the inclosed parts of the plant have corrugated-metal siding and roofing. The belt-conveyors and the chain feeder are driven through speed-reducers and gears. The screens and crushers are multiple-V-belt driven.

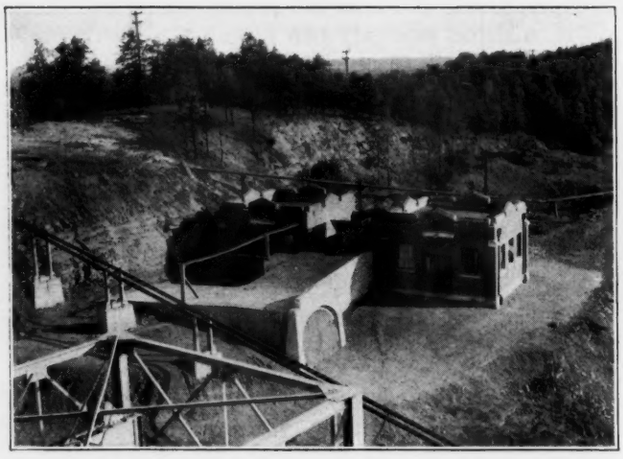
The plant motors are controlled from a main switchboard in the control room, but they also have local push-button switches. An automatic sequence

Main skip car dumping to plant-tipple pocket.

starting-and-stopping system with refinements is used. When a motor overheats, it actuates a thermal relay and stops all the plant machinery in sequence. A breakdown occurring anywhere in the plant has the same effect.

An unusually efficient ventilating system was necessary in the Muscoda limestone mine because feeders of explosive methane gas, associated with a light oil, which probably originated in a bed of bituminous shale above the deposit, seep into the mine through joint planes in the rock. Because of the large capacity of this system, the methane content in the air is held down to a trace, and gases resulting from blasting in the mine are efficiently removed. Although the efficiency of the ventilating system makes it impossible for the methane gas to collect in sufficient quantities to become explosive, all possible precautions are taken. All working faces are inspected for gas twice daily by a certified fire boss, and analyses for gas content are made periodically.

An 8-ft. by 3-ft. 6-in. double-inlet reversible fan, with a capacity of 150,000 cu. ft. of air per min., is used for the ventilation of the limestone mine and No. 4 and No. 6 ore mines. Auxiliary ventilation is provided for that portion of the levels and stopes ahead of the last cross-cut by blower fans with a capacity of 2,800 cu. ft. per min. each. One of these is located at each heading and delivers the air through canvas tubing to the working faces. Each of the 8 small blower fans is driven by a 5-hp. alternating-current motor. The main fan is located on



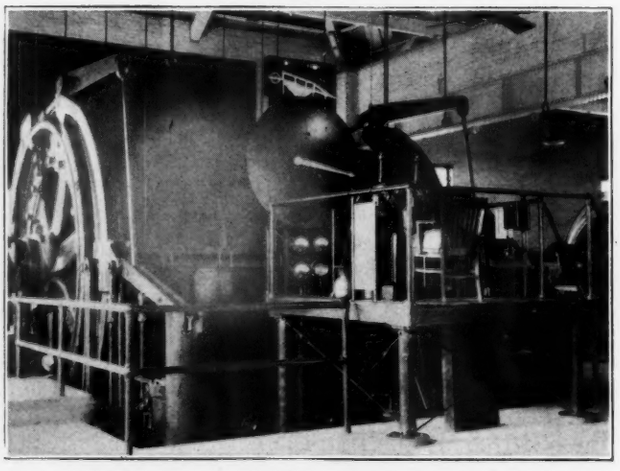
Ventilator building and the mine ventilating-fan duct.

the surface, above the tipple at the head of an old manway, which has been converted into an air way. This fan is driven by a 125-hp. motor. It can also be connected in case of an emergency to an 80-hp. gasoline engine. Each of these power-units is housed in its own concrete-and-brick structure, one on each side of the fan, which is not in a building. Each unit drives the fan through multiple-V-belts. In ordinary operation under electric power when the current is interrupted and the fan slows down, an electric horn automatically gives a warning so that the gasoline engine can be started immediately and drive the fan through a friction clutch. A green blinker signal gives the warning should the power failure occur at night.

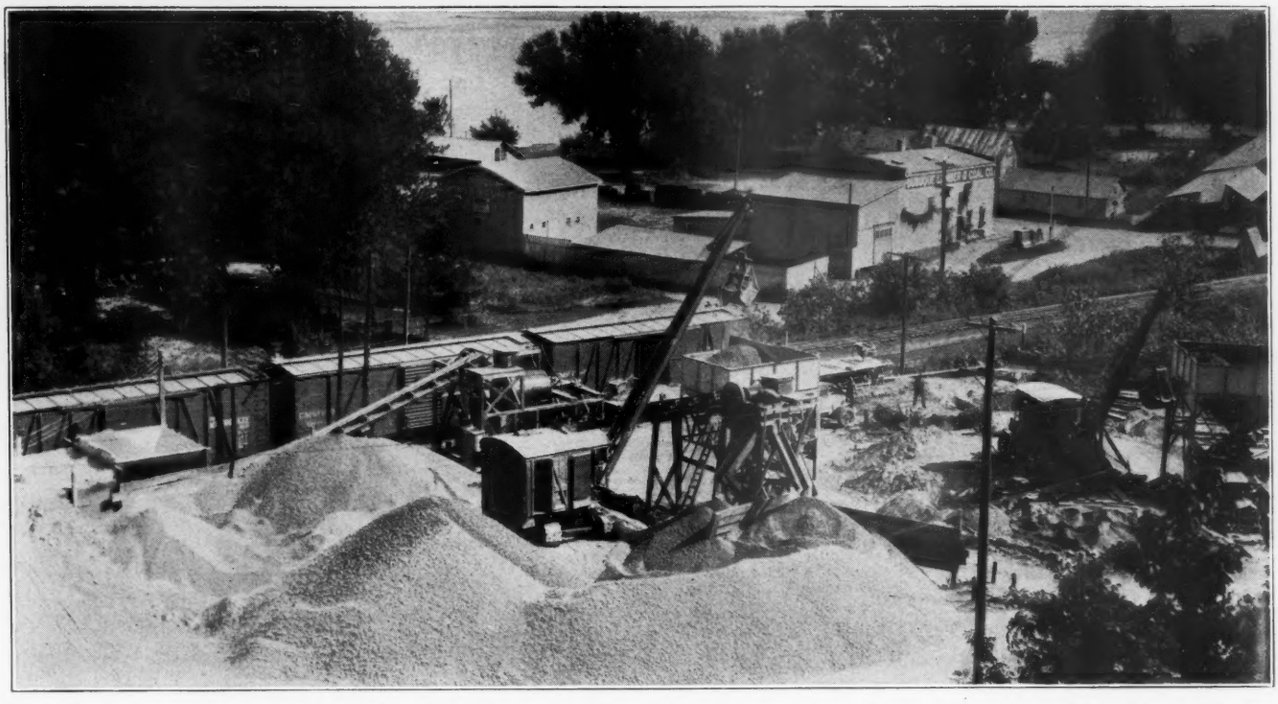
The power used at this plant comes from the Fairfield steam-generating plant of the company, where blast-furnace gas and powdered coal are used as fuel. This unit also furnishes most of the power for the company's other operations and is tied in with the lines of the Alabama Power Co.

Power is received at Muscoda at 44,000 v. and is reduced at a 5,000 kilovolt-ampere substation to 2,200 v. for all plant motors except the vibrating screens and belt-conveyors. In the mine the main hoist and pump motors use 2,200-v. current and the

(*Continued on page 31*)



Hoist in the power-house which operates the main skip car.



Looking down on the new washing plant from the quarry floor. Note arrangement of stock-piles to control moisture content.

Crushed-Stone Producer Builds Washing Plant to Meet Specifications

Dubuque Operator Furnishes Material in Three States, All Within Sight of Plant

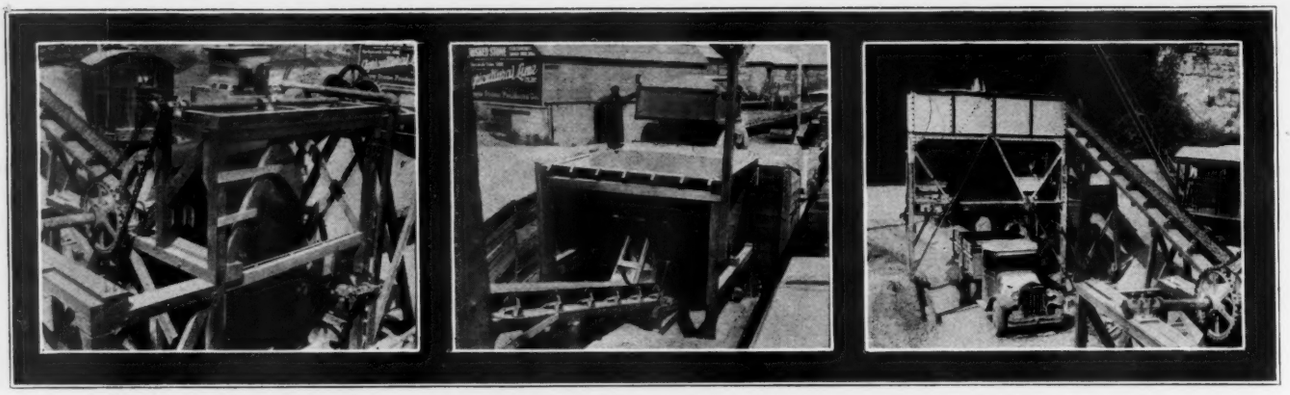
THE Dubuque Stone Products Co. of Dubuque, Ia., has always been in an unusual position with respect to its market because of its location. The plant is within the city limits of Dubuque, which is on the west bank of Mississippi River, with its center directly across the river from the boundary line between Wisconsin and Illinois, which have the river for their western boundaries. It is a haul of less than 3 mi. into Illinois and of less than 1 mi. into Wisconsin from the plant. The sales territory of the plant, therefore, lies in these three states, each having entirely different specifications for aggregates.

The crushed-stone plant operated by the company was built in 1927 and is one of the most flexible in this section of the country because of these conditions. The situation was further complicated when the state of Wisconsin recently specified that crushed-stone used for concrete aggregate on state work must be washed.

Soon afterward the company was awarded a contract to furnish stone for 6.4 mi. of concrete pavement in Wisconsin, beginning 2½ mi. from the end of the Dubuque-Wisconsin Bridge across Mississippi River. As the Iowa end of this bridge is only a few hundred feet from the plant, this made deliveries very convenient. The company immediately designed and built a washing plant, which went into operation on Sept. 2, 1932. All the equipment for this plant, which has a washing capacity of 150 tons per hr., was furnished by the Stephens-Adamson Mfg. Co. The washed material easily passes all tests for cleanliness.

This plant was built large enough to meet any reasonable demand for washed stone and is operating at about one-half capacity to fulfill the present contract. If other Wisconsin highway contracts are received, the company will have ample facilities for supplying the washed stone. There is also the possibility that the states of Iowa and Illinois may later specify washing and, in that case, the company will be in a good position to supply the material. The plant is a semi-portable unit of timber construction bolted together but, if desired, it can easily be inclosed and made permanent. The installation is such that it can also be used as a central batching plant to load mixer trucks should a demand for ready-mixed concrete ever arise.

The specifications also require that the materials for the present job be furnished in two separate sizes to be recombined at the job in order to reduce segregation. These sizes are ¼-in. to ¾-in. and ½-in. to 1½-in. The specifications also require that the moisture content of the aggregates be consistent to facilitate mixing at the job. Because of these requirements it is necessary to handle each size of ma-



Washing screen, showing chain drive and both belt-conveyors.

Truck loaded with stone discharging at washing-plant hopper.

The stock-piling conveyor and truck loading beneath bin.

terial separately through the plant and also to stock-pile the sizes separately. As the specifications also require that washed material remain in a stock-pile at least 12 hr. before using, it is also necessary to have two stock-piles for each material so that one may be used while the other is being made. These stock-piles also must be built up in layers about 3 ft. in thickness as a further means of controlling segregation. As a result of these precautions the material loaded out from the stock-piles has varied in size only about 1 per cent. where 10 per cent. is the permissible variation, while the moisture content has varied less than 1 per cent.

Stone is loaded from the main plant bins into 7½-ton Mack trucks, which haul a distance of about 300 ft. to the new washing plant. The trucks back up a dirt ramp and dump the stone into a 7-cu.yd. steel-lined wooden hopper. A lever-controlled arc gate feeds from the hopper to a 24-in. inclined belt-conveyor which operates on 51-ft. centers. This discharges to an 84-in. Stephens-Adamson Gilbert type conical washing screen, which is double-jacketed with ¾-in. and 3/16-in. openings on the inner and outer jackets, respectively, to spread the load and insure a thorough washing of the stone. A 6-in. baffle at the feed end of the screen allows the stone to scrub itself before passing on into the screen. A layer of stone is always present at this baffle, which takes the wear of the stone fed to the screen as well as the wear due to the scrubbing action at this point. This method is also used in the screens in the main plant and has been found greatly to increase the life of the screens, which ordinarily wear out at the feed end before the remainder of the screen surface shows appreciable signs of wear. This principle is also used in the chutes in the main plant. The water and silt from the washing screen go to a settling box which overflows into the river. The washed stone is fed to a 24-in. inclined belt-conveyor which runs on 68-ft. centers and feeds, through a dividing gate, either of two chutes leading to temporary piles of the two sizes of stone. A Thew Type O gasoline crane, with a ¾-cu.yd. Blaw-Knox clam-shell bucket, rehandles the material to the stock-piles.

The washing plant with the crushed-stone plant in the background.

The conveyors are driven by 15-hp. and 7½-hp. electric motors, respectively, through Texrope and gear drives. The washing screen is chain-driven from a jack-shaft which is bevel-gear driven from the first conveyor head-pulley. Goodyear conveyor belting is used. Wash-water is pumped from Mississippi River by a 2-stage centrifugal pump having a capacity of 300 gal. per min. Spray nozzles of the company's own design are used in the screen.

The crane previously described also rehandles the two sizes of aggregate from the drained stock-piles to a 2-compartment Butler steel truck-loading bin which has a capacity of 25 tons of coarse material and 15 tons of fine material. A Butler 2-compartment, 3,000-lb. weighing batcher, with a 2-beam scale and a Starr balance indicator, weighs and loads the materials into batcher trucks for shipment.

Sand is brought in from a plant a few miles away to another stock-pile. A Byers truck crane, with a gasoline motor and a ½-cu.yd. Byers clam-shell bucket, is mounted on a Mack truck chassis. This handles the material from the stock-pile to a 65-ton Butler one-compartment, steel bin which has a weigh-batcher of 826-lb. capacity. Cement is received in bulk and is unloaded from cars by hand into 2-wheeled buggies of the type used on construction work. These are weighed on a platform scale and dumped into the trucks.

Theoretical and Practical Developments in Portland-Cement Chemistry

Part IV—The Hardening of Cement Mortars

By PROF. DR. HANS KÜHL
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THE interest of the average observer in the hardening of mortars is not so much in the chemical reactions that are at the root of the phenomenon as in the physical process of petrefaction itself. While in the realm of chemistry the object of research is always a chemical transformation, *i.e.*, the formation of a new product with entirely different properties from the original material, in the study of mortars we are constrained to deal primarily with a single phenomenon which accompanies the chemical reactions, namely, hardening. This is the characteristic of all cementitious materials, and the one which gives to the chemistry of mortars its unique position.

As the external indication of the process of setting and hardening we have the fact that the liquid phase, the mixing water, gives with the cement a solid reaction product, and we must conclude from this that there is combination between the water and cement. Whether this consists solely of an absorption of water by the cement molecules similar to that which can be proved to take place in the hardening of gypsum, or whether there is chemical interaction between the constituents of the cement and the mixing water, can not be determined from the macroscopic examination of the setting and hardening process.

The difficulty of the problem has resulted in its being first treated from a purely theoretical point of view. Analogies were sought in the spheres of inorganic and organic chemistry, and many well-known phenomena of solidification were found which could be regarded as parallels of the hardening of hydraulic mortars. First among these we have the setting of lime mortar and of plaster of Paris. The state of knowledge at that time was such that the hardening of lime mortar was considered to be due to the formation and crystallization of calcium carbonate and that of plaster of Paris to the formation and crystallization of the dihydrate.

At an early date it was agreed that the comparison with lime mortars was unsound, since their hardening in air was not due to reaction with the water but to the presence of carbon dioxide. As a result, a number of workers were confirmed in their belief that they had discovered the prototype of the hardening of cements in the hydration of plaster of Paris, and still believe that the hardening of hydraulic mortar can be explained by crystallization and the interweaving of crystal needles. Quite a different standpoint is taken by another group of investigators, led by Michaelis, who revert to the simple analogy of glue and attempt to find the key to the problem of the hardening of cement in the phenomena of the hardening of glue. In the case of glue, as in that of pastes generally, the attainment of strength is due not to crystalloid but to colloidal action. The hardening of adhesive materials is due simply to the shrinkage of swollen gels.

From a superficial point of view, the hardening of cement is very far removed from the shrinking of a gel, and it requires considerable ingenuity to discover a parallel between the solidification of gelatine and of a cement mortar. At first Michaelis's theory was rejected by almost all. Even the fact that shrinking processes closely resembling those occurring in the hardening of organic compounds are well known in the inorganic world at first aroused little interest in, or agreement with, the theory of Michaelis. The examples of flint and agate, which are produced by the drying out and shrinkage of silica gel, did not appear convincing, because cement mortars obviously do not harden by drying out since they also solidify under water, under which condition drying out is apparently impossible.

It is thus not surprising that the adherents of the colloidal theory of hardening only slowly won ground, the more so as it long appeared that the polarization microscope, which had thrown the first light on the constitution of Portland-cement clinker, could also give new and important knowledge relating to the hardening of hydraulic mortars. Pioneer work in this direction was carried out by Ambronn some 20 yr. ago. He studied microscopically the reaction between fairly coarse graded cement grains and water, and found that a series of changes, which could be easily observed under the microscope, and which he believed would allow definite conclusions to be drawn regarding the hardening process, occurred. The method of Ambronn was later used by numerous other investigators, among whom Keisermann, Blumenthal, and Scheidler may be mentioned. These workers investigated not only Portland cement but also other cementitious materials, such as blast-furnace slag. They all employed the same procedure, embedding isolated grains of material in water and observing microscopically the changes taking place in the water envelope surrounding the cement grains. These three investigators were unanimous in distinguishing three groups of phenomena, viz., the formation of plates, of needles, and of isotropic gel masses without sharp boundaries. The chemical constitution of these three forms of matter was at first not known, and it was only when methods of staining were introduced that satisfactory results were obtained. Staining with acid or basic dyes, which are strongly and selectively absorbed by

silica, alumina, or lime, offers a qualitative method of ascertaining the composition of the various new microscopic products. It is then possible without undue difficulty to obtain information regarding their quantitative relationships. The number of new forms that are to be observed under the microscope, originating from different cements, is very great, especially in the presence of various added materials. Only the most important will therefore be considered here. As already stated, small plates, needles, and masses of gel occur. Two types of plates can be distinguished, viz., large hexagonal tables of calcium hydroxide, and small hexagonal tables consisting of calcium hydroaluminate. With regard to the latter, it is still doubtful whether it consists of tricalcium or tetracalcium hydroaluminate, the second being the view generally held in America.

The needles formed from the interaction of cement and water are of three kinds. First, in certain cases, is the formation of gypsum crystals. As is shown by Fig. 1, these form thick rods of high double refraction and are relatively easily recognizable. In company with this strongly developed formation are fine needles which occur in two varieties of very different chemical composition. The first is composed of lime, silica, and water, and its composition is in general agreement with a monocalcium hydrosilicate. The second type of needle is found in cements of high gypsum content; it represents a double salt of tricalcium aluminate and calcium sulphate, and is usually but incorrectly described as calcium sulphoaluminate; its correct name is calcium aluminate sulphate. While calcium sulphoaluminate mostly occurs in radial clusters, the needles of calcium hydrosilicate tend to appear separately and not in masses. Finally there are the masses of amorphous gel which collect in a spongy structure around the grains of cement. Most investigators consider this gel to consist of monocalcium hydrosilicate which has not as yet crystallized out of the mortar.

Fig. 1. Needles of gypsum between crossed Nicols.

Many of these new products obtained on the decomposition of Portland-cement clinker can also be formed synthetically from lime, silica, alumina, and sulphuric acid. The first success was attained with the most complex of the compounds, calcium sulphoaluminate. Michaelis, who discovered calcium sulphoaluminate simultaneously with the French worker Candlot, prepared this salt from aluminium sulphate and calcium hydroxide, and succeeded in isolating it and investigating its constitution.

The hydrosilicates and hydroaluminates of calcium are formed on the prolonged suspension of precipitated silica or alumina in lime-water. Syntheses such as those here considered have long been

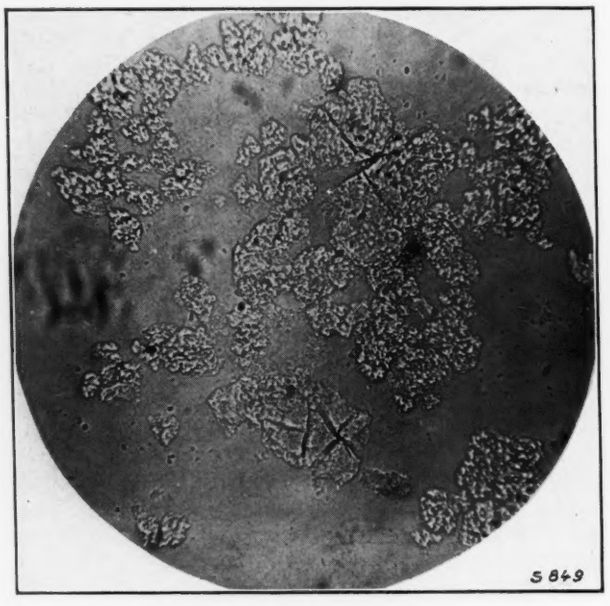


Fig. 2. Silicic-acid gel.

studied by the author, who at one time carried out an investigation in which precipitated silica, precipitated alumina and lime water were allowed to interact over a period of more than 10 yr., the course of the reaction (which was characterized by the withdrawal of lime from the lime water) being followed titrometrically in the solution and microscopically in the solid phase. The formation of the same compounds as are obtained in the decomposition of cement was observed. Unfortunately, owing to the war, this work was never concluded, and results have not been published. In the course of it, however, a series of preparations of which photomicrographs were preserved was made, and a selection from these is here presented.

Fig. 2 shows a silica gel used in this research. The silica was extracted from cement, washed on a filter, and then mixed with a little water. Fig. 3 shows the change experienced by the silica gel after a month or two in contact with lime-water. There is no sign of the formation of needles. On the other hand, it is seen how the gel-complexes have been modified by the lime, and have taken on a cobweb-like texture. Evidently a gel of calcium hydrosilicate is being formed.

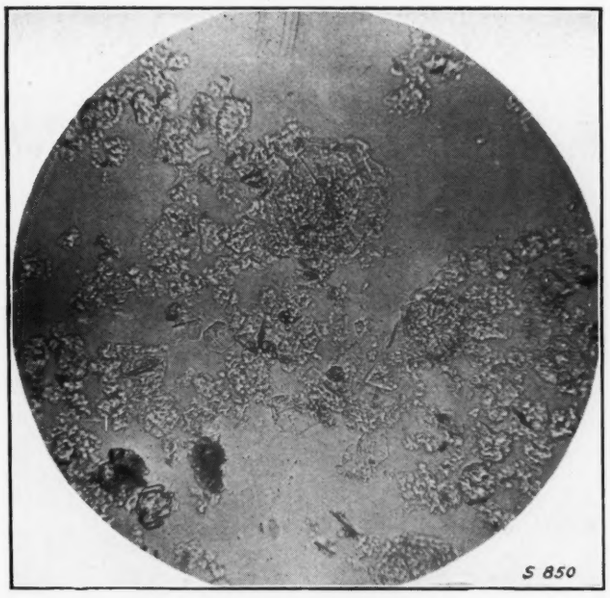


Fig. 3. Calcium hydrosilicate beginning to form.

Fig. 4 shows a dense maze of needles of calcium sulphoaluminate. This preparation was obtained by pouring an aluminium sulphate solution into lime water. By careful manipulation and thorough stirring the precipitation of alumina can be avoided. Should the mixing be locally incomplete, a colloidal precipitate of aluminium hydroxide is thrown down, and only slowly disappears. Such a precipitate is shown in Fig. 5, in which can also be seen the manner in which the drops of aluminium hydroxide gel give rise to dense masses of sulphoaluminate.

If one begins with precipitated alumina instead of aluminium sulphate, treating with gypsum-water and lime-water, this formation of dense clusters completely predominates the reaction, as can be seen in Fig. 6, or at greater magnification in Fig. 7. Under these circumstances the needles of sulphoaluminate grow out farther and farther from the dense aggregates first formed, until finally there are large irradiating stars around a dense nucleus. A particularly well-developed star formation of this type is shown in Fig. 8.

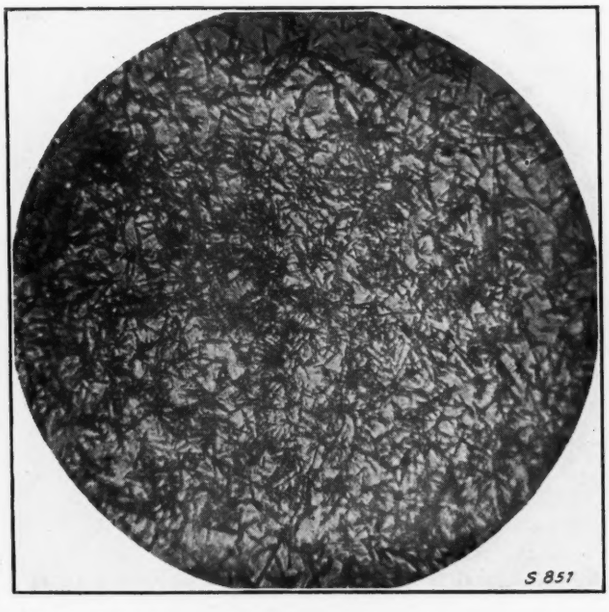


Fig. 4. Calcium sulphoaluminate from aluminium-sulphate solution and lime water.

The facts that the products of the reaction between cement and water have been observed as such, and have also been produced synthetically, must react strongly in favor of the crystalloid theory of hydraulic hardening. When well-defined needles and plates can be both produced synthetically and observed as a result of the hydration of clinker, it may, perhaps, be accepted with a fair degree of certainty that the solidification of cement mortar depends on the interweaving of these plates and needles, as in the case of gypsum. This conclusion, although it appears so probable, is nevertheless fallacious. The author has for many years sought to discover, in thin sections of set cement, these plates,

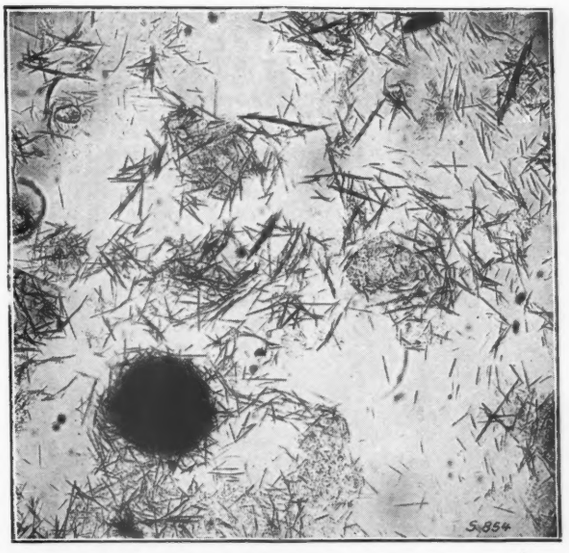


Fig. 5. Local formation of calcium sulphoaluminate from aluminium-sulphate solution and lime water under imperfect conditions.

needles, and masses of gel which can be demonstrated so well in preparations of cement in excess water. All such attempts have, however, failed to achieve their object. When thin sections of old cement test-pieces are examined microscopically, not a trace of these needles and plates can be found. At most, and in exceptional cases, an odd plate of hydrated lime can be seen. What is shown by such an examination is a residue of undecomposed cement particles, separated by a grey and only slightly differentiated mass; which gives a feeble diffused luminescence in polarized light. Even under the highest magnification individual particles can not be distinguished in this material, which is obviously almost entirely ultramicroscopic in structure.

It appeared possible that these needles and plates could not be clearly recognized because, owing to the dense structure of the cement mass, they formed only in minute sizes. An endeavor was therefore

made to give the crystals a better opportunity for development by working with cement pats gaged with more than the normal quantity of water, viz., with 30, 40, 50, 60 and 70 per cent. Even a thin mortar paste containing 70 per cent. of water hardens sufficiently in a week to enable a thin section to be prepared. The hope of being able to observe the various phenomena better in such sections was, however, not fulfilled. A pat formed from as much as 70 parts of water to 100 parts of cement showed neither plates nor needles when a section was microscopically examined; it contained exactly the same slightly differentiated grey ground-mass as cement mixed with 25 or 30 per cent. of water.

The specimens described were prepared more than 20 yr. ago, and were neglected until the writing of the present work was first considered. On examining the old specimens it was found that the passage of the years had resulted in fundamental changes. No longer were they uniform and only slightly differentiated under polarized light, as was the case a few months after their preparation. They now showed a definitely increased transmission and, most noteworthy of all, their properties were markedly different according to the percentages of water with which they had been gaged. The specimens gaged with the greatest amount of water showed the greatest changes, while those mixed with the least water had undergone considerably less modification. Figs. 9 and 10 show two photomicrographs representing respectively cement pats gaged

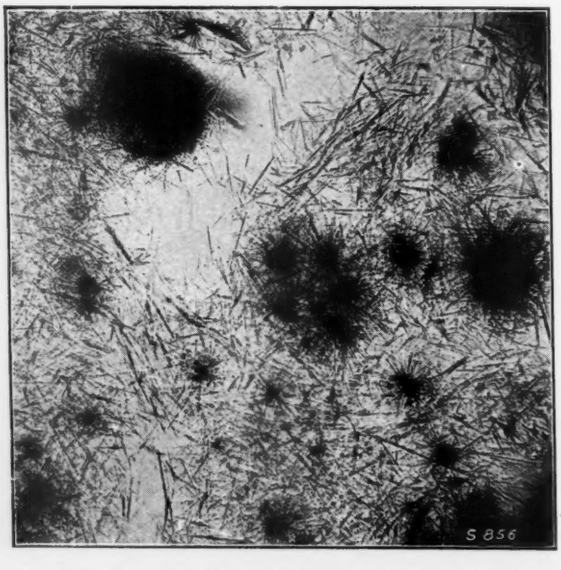


Fig. 6. Formation of calcium sulphoaluminate from alumina gel.

with high and low proportions of water. Shortly after their preparation both these showed almost no transmission of light between crossed Nicols. The present appearance of these sections must be attributed to the changes which have taken place during the 20 yr. since they were mounted in Canada balsam as microscopic preparations. From this we may draw two conclusions. First, the substances to which the strength of cement is originally due are unstable and are slowly transformed to a stable condition. Second, the speed of this transformation is dependent on the water content of the system.

Before dealing with my own interpretation of the experimental data on the hardening of cement at our disposal, it should be emphasized that the observed phenomena are entirely different according to whether a thin section of hardened cement mortar is examined or the progress of the reaction between

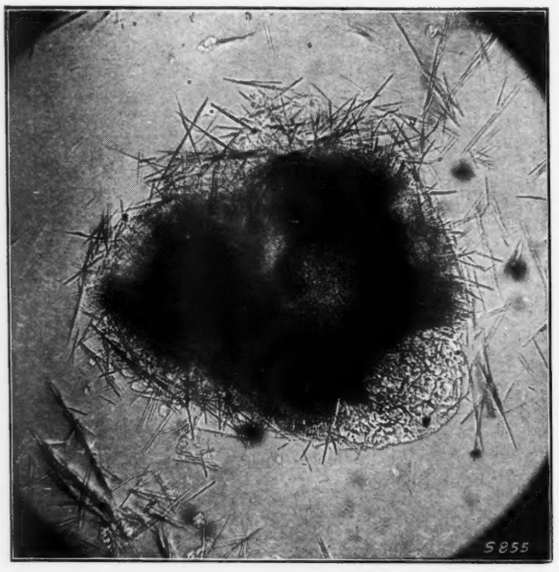


Fig. 7. Formation of calcium sulphoaluminate from alumina gel (highly magnified).

individual cement grains and excess of water is followed. Let us examine the reason for these great differences, the key to the understanding of which is no doubt to be found in hydrolysis. When cement is mixed with 25 or even 70 per cent. of water to form a plastic mass—even though it be of the most liquid consistency—the concentrations in the liquid phase are totally different from those arising when a few grammes of cement are distributed in a large quantity of water (say a liter), corresponding to the conditions under which those investigators work who immerse isolated cement grains in water. It is only necessary to consider that barely 2 g. of calcium hydroxide is soluble in a liter of water to realize the fundamental difference between the two methods of research. When 100 g. of cement is mixed with 30 g. of water, saturated lime-water is at once formed. Only 40 mg. is required for this purpose, while in the 100 g. of cement we have at our disposal 60 g. of lime, or an excess of over a thousandfold. Suppose, on the other hand, we treat a few grammes of cement, containing, say, 2 to 3 g. of CaO, with a liter or more of water; the greater part of, or even in certain circumstances all, the lime can enter into solution.

If we now consider that the reaction products are calcium hydroaluminates and hydrosilicates, substances extremely susceptible to hydrolytic decomposition, it is immediately clear that the reaction conditions that prevail will vary between extreme limits according to the quantity of water present. When Portland-cement is slowly treated with water,

by, for instance, placing it in a filter and washing it hourly or daily with water, all the lime is ultimately removed, and silica and alumina remain in the filter. Thus, in extreme cases hydrolysis proceeds to such an extent as to result in complete decomposition into calcium hydroxide, alumina, and silica. When, on the other hand, the hydroxides of silica and alumina are suspended in lime water, and the lime taken up from solution is replenished by additions of fresh lime water, we find that the initially free alumina and silica combine with the lime, forming calcium hydroaluminates and hydrosilicates. We must conclude from these observations that Portland-cement is completely decomposed into the free hydroxides by a sufficient excess of water; that a moderate excess of water results in the formation of the compounds observed by Ambronn, Keisermann, Blumenthal, and other investigators; but that cement mixed with the proportions of water usual in practice is subject to quite different reactions, which result neither in complete decomposition with formation of the hydroxides nor in the production of the needles and plates formed under other experimental conditions.

Although it has been shown that the investigation of cement in the presence of great excess of water or salt solutions is not in the least related to the reactions that occur in mortars in the presence of only a small quantity of water, nevertheless even recently the old methods have been repeatedly employed. It is believed, however, that the present discussion convincingly shows that the problem of hardening is not to be solved in this way.

The author's views upon the subject are based on the so-called gel theory of Michaelis. In my opinion, hardening is due to the shrinkage of a gelatinous mass, although there is evidence that crystallization processes also take part. These latter can not, however, explain the fundamental problem, otherwise their products would be evident in the form of needles and plates in the microscopic study of hardened cement. The author entirely accepts Michaelis's views of the nature of the shrinking process. First, a porous gel-mass is formed by the action of water on the surface of the cement particles, and to this is due the cementing together of these particles. This comparatively weak gel then hardens by giving up its water. Apart from the fact that drying out plays a definite part in air-hardening, the chief mechanism of the abstraction of water from the gel-mass—and of the consequent shrinkage and hardening—is the so-called "internal absorption." By this we understand that the nuclei of the cement grains, at first unattacked, are gradually hydrated. They thus form new masses of gel, and abstract the water necessary for this from the porous gel already formed, which as a result shrinks and attains strength. This process continuously proceeds until it has penetrated to the innermost cores of the cement particles; in the case of cements that are not finely ground this may require a number of decades.

Side by side with the increase in strength of the gel due to internal absorption, it also undergoes a chemical change, as is shown by the steady increase in the quantity of material capable of polarizing light. While at first the gel is almost optically isotropic, as we have seen, it becomes more and more optically active with the passage of years, and we must conclude that there is an ultramicroscopic crystallization of the amorphous material. It may be pointed out that, in the highly concentrated liquid system in which hydraulic hardening occurs, the reactions proceed initially in the manner described by P. P. von Weimarn, to whom we are greatly indebted for our knowledge of precipitation in highly-concentrated solutions. Even common salt can be precipitated in colloidal form from a highly-concentrated solution, and in the same way colloidal compounds are first thrown down from the saturated liquid phase present in cement mortar. Further, colloidal precipitates of chemically simple substances frequently change to the microcrystalline state with lapse of time, and we must assume the occurrence of a similar phenomenon in the case of the substances formed on the hydration of hydraulic mortars.

Accepting the above general explanation of hardening, the question of the chemical nature of the colloidal products at once arises. In discussing this it is proposed to ignore the calcium ferrites contained in clinker, as there is at present no information available regarding their hydration. A little may be said, however, regarding the aluminates and silicates.

Amorphous calcium hydroaluminates are unknown. This does not, however, exclude the possibility that in the hardening of cement the hydro-

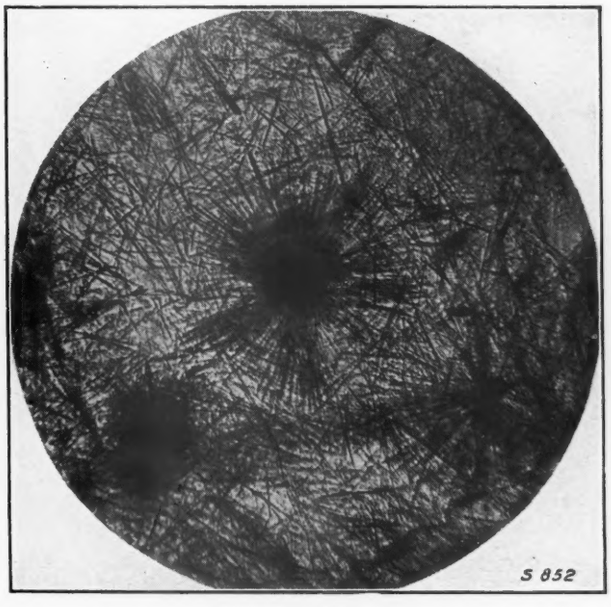


Fig. 8. Genesis of a radial aggregate in the formation of calcium sulphoaluminate from alumina gel.

aluminates may at first be formed in the amorphous state; the concentrations in cement mortar are quite different from those attained in the laboratory preparation of aluminates. On the hydration of the clinker aluminates, tricalcium hydroaluminate—and, perhaps, also tetracalcium hydroaluminate, if it exists—must be produced in the amorphous form. It is in any case certain that the hydroaluminate

formed must be that highest in lime. This is determined by the fact that in cement mortar we are dealing with a continuously saturated solution of lime, and only aluminates saturated with lime can exist in equilibrium with such a solution.

The same is true of the hydrosilicate whose presence we must accept in hardened mortar, and again only the highest calcium compound capable of existence comes under consideration. Exactly which silicate this is, has not yet definitely been established. Early investigators fairly generally assumed it to be the metasilicate, *i.e.*, monocalcium hydrosilicate. Michaelis has found, however, that under suitable conditions 1 molecule of silica is able to combine with considerably more than 1 molecule of lime in an aqueous system. At one time he proposed 1½ molecules of lime to 1 molecule of silica, but later he rejected this and advanced the opinion that definite stoichiometric proportions did not hold, but that we were dealing with adsorption compounds of variable composition. He perceived that the varying numerical relationships in his researches were attributable to the fact that hydrolysis had proceeded to a greater or less extent.

Quite recently the question of the constitution of calcium hydrosilicate has been studied by Klasse, who has found strong grounds for believing that the continued contact of lime and silica in saturated lime-water gives rise to an orthosilicate, viz., dicalcium hydrosilicate. This compound, which also occurs naturally as Hillebrandite, must therefore be accepted as one of the products of the reaction between tricalcium silicate and water occurring in a cement mortar. If we grant this assumption, one-third of the lime present in tricalcium silicate must be set free on hydration, and even though part of this calcium hydroxide were utilized for the formation of tetracalcium hydroaluminate, etc.,—which is extremely improbable—there is still a definite residue of lime which is present in the free state in hardened cement. Whether this calcium hydroxide separates in the colloidal or crystalline form is unknown; it must certainly be admitted, however, that the greater part, or at least a portion of the $Ca(OH)_2$, first appears in the amorphous or colloidal form; otherwise crystal formation would be apparent even in fresh mortar under the polarization microscope. There is no insuperable difficulty in accepting the existence of a colloidal calcium hydroxide, since it has long been known from investigations on lime mortars that freshly-slaked lime paste contains a considerable proportion of its hydrated lime in a colloidal, gelatinous form. Indeed, the most important properties of lime paste from the point of view of mortar are due to this colloidal hydrate.

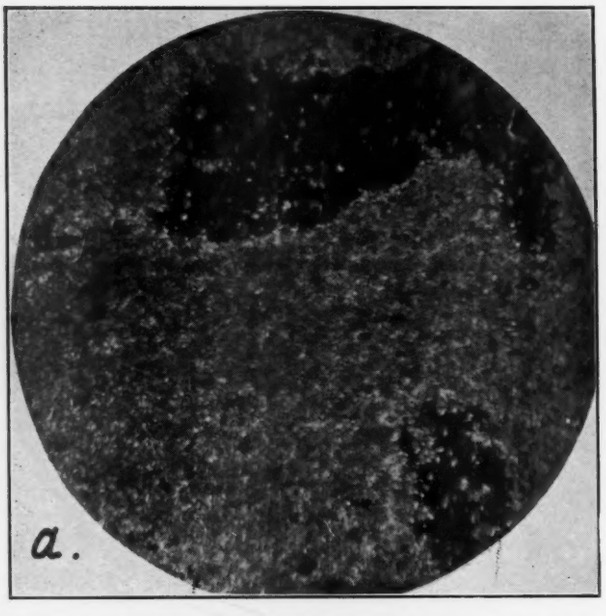


Fig. 9. Cement gaged with excess water (20-year-old thin section between crossed Nicols).

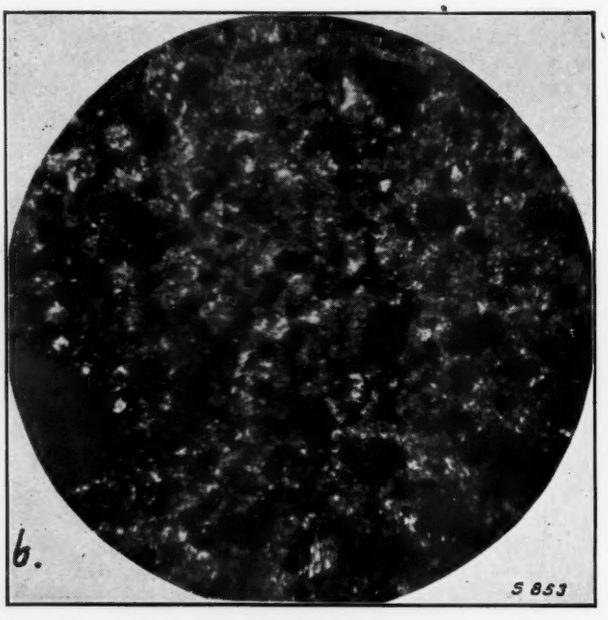


Fig. 10. Cement gaged with little water (20-year-old thin section between crossed Nicols).

The only one of the new compounds formed in hardened cement-mortar to which we are unconditionally compelled to ascribe a crystalline structure is calcium sulphoaluminate; at any rate the author is unaware of any instance of this compound having been observed in the amorphous state. Since this salt forms fine needles showing strong double refraction, it must be concluded that these needles will consistently be found in hardened cement, for the reaction conditions for the formation of this compound are rarely lacking. In spite of this the salt almost always escapes observation, and the reason for this must be that even in good sections its fine needles are masked by gel and are thus inaccessible to observation. Even when conditions are provided under which large quantities of calcium sulphoaluminate must be formed—by adding a considerable proportion of gypsum to a Portland-cement, for instance—it is still extremely difficult to disclose the fine needles of this salt under the microscope. The supposition that the small quantity of calcium sul-

phoaluminate crystals is embedded in the gel can in no way be considered an objection to the amorphous gel theory of hardened cement mortar.

It has thus been convincingly proved that, if we ignore the unimportant minor constituents, hardened cement mortar must be regarded as an unstable gel consisting of dicalcium hydrosilicate, tricalcium hydroaluminate, hydrated lime and calcium ferrites of unknown composition. All these ingredients tend slowly to pass over into the crystalline form, although this transformation requires a period of some years before it can be observed and some decades before it is complete. We are ignorant of the order in which the different gel compounds assume a microcrystalline structure. Probably the calcium hydroxide and calcium hydroaluminate are first affected, followed only at a later stage by the gradual transformation of calcium hydrosilicate.

While our knowledge of the speed of transformation of the originally formed gel to the crystalline state is small, we are only slightly less ignorant regarding the speed of the much more important process, hydration itself. With coarsely-ground cements decades must elapse before the grains are completely hydrated, as is proved by the fact that old cement pats, which have been stored for 20 or even 30 yr. in water, have the ability again to set and harden when they are re-ground. With the more finely-ground modern cements the reaction must proceed more rapidly.

It would, however, be quite false to assume that as soon as a cement paste has set or solidified a considerable proportion of the active cement mass has already been utilized. Even after 28 days' hardening only the surface layers of the cement grains have been decomposed by the water, as has recently been proved in an interesting study by Anderegg in the United States. This investigator succeeded in measuring on cement grains the thickness of the layer through which the hydration process had penetrated after different periods of time. He found that the depth of penetration only amounted to a few thousandths of a millimeter after 28 days and that, accordingly, only the very finest cement grains could be completely hydrated in 28 days.

With this knowledge as a basis it will be realized how erroneous it is to assume that the different chemical components of cement react in a definite order, one after the other; *e.g.*, that the aluminates are first decomposed by water, causing the phenomenon of setting, and that the hydration of the silicates follows the first reaction and is the cause of hardening. In reality the hydration of aluminates, silicates, and ferrites proceeds simultaneously and continuously, and the hydration of the grains of clinker depends not upon a selectivity among the chemical components but upon the depth to which the reaction has penetrated from the surface towards the center.

Hardened cement, as an unstable gel, presents all the properties of such a body. This has been convincingly proved in a recent paper by Gessner. Although Gessner believes there is a definite break in the vapor pressure isothermal of hardened cement at 10.4 mm. of mercury after 3 days, from which he deduces the presence of a definite hydrate in the hydrated envelope surrounding the grains of clinker, he nevertheless finds that this is compensated as the hydration proceeds, resulting in a system ranging from water mechanically held by capillarity to truly chemically-combined water. In the author's opinion this conception of a cement gel must, in the present state of knowledge, be accepted as correct. It offers a key to all the available chemical and technical data on cement gel.

Muscoda Mine (*Continued from page 22*)

fans 220 v. A 300-kw. motor-generator set, operating on 2,200-v. current, generates 250-v. direct current for the mechanical loaders. In the plant a 15-kw. motor-generator set furnishes direct current for the magnetic pulley and for the variable-speed motor of the chain feeder. Most of the 2,200-v. motors are of the across-the-line-starting type.

The power-house for the stone plant and mine also serves the ore mines and plants at Muscoda. In this building is the hoist which operates the main skip, and the compressor which furnishes air for drilling and other purposes for the stone plant and mine and part of the air for the ore mines. The main hoist has a single fixed drum which is 10-ft. in diameter and has a 13-ft. face. It is driven through speed-reducing gears by an 1,800-hp. direct-connected motor and has a rope speed of 2,000 ft. per min. The hoist has the regular double-post brakes and a dynamic brake as well. An additional safety feature is an automatic hoist controller and a remote-control limit switch. The hoisting cable is 1⅜ in. in diameter. The cable runs from the mine over a sheave at the top of the stone plant to a turn sheave which is set in concrete at ground-level and from which the cable goes at right angles to the hoist. The compressor is a 5,200-cu.ft. per min. 2-stage unit driven by a 1,000-hp. motor. It is equipped with an automatic unloading valve, an air-filter and an air-receiver. The building in which it is placed also houses the main plant and mine switchboard.

The 50,000-gal. settling tank with waste pond below.

Novel Skip Hoist Uses Wire Ropes Instead of Rail Guides

HOISTING from the quarry floor to ground level at the quarry of the Big Bend Quarry Co., St. Louis, has become a one-man job instead of one requiring the services of five employees, thanks to a new and novel skip hoist designed by Supt. Thomas F. Bush and R. N. Skrainka, secretary-treasurer.

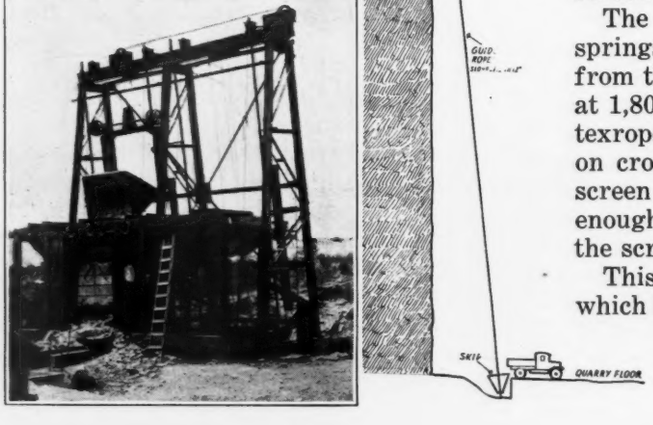
The September issue of *The Yellow Strand* describes the installation in detail. In designing the hoist, the originators conceived the idea of using wire rope instead of the usual steel guard rails with their necessary and expensive supporting framework. As a result, the wire-rope equipment was installed at about one-fourth the cost of a similar installation employing rigid rails.

The designers first constructed a small working model of the proposed hoist. This model operated so successfully that they immediately began installing the actual equipment in the quarry. The accompanying diagram and picture show the general arrangement and the method of operation. Two 5-ton motor trucks are used in the quarry. These are loaded with stone by means of a gasoline shovel. The trucks dump directly into the skips. A double-drum hoisting engine is used, with individual hoisting ropes for each skip.

The hoist is of the reciprocating type. The skips are connected by a steel cable and counterbalance each other when empty. There are two 1-in. guide ropes for each of the skips, these ropes being anchored to the quarry floor by long bolts. The guide ropes are on a slope of 1½ in. per ft. A surplus length of cable is carried at the bottom so that, when the quarry floor is lowered, it will only be necessary to let out the cables and re-anchor them.

The hoist has been in operation for several weeks and has resulted in a material increase in tonnage. The layout is capable of handling 2,000 tons of stone per 10-hr. day without difficulty. Each skip has a capacity of 5 tons of stone and operates on a rise of 200 ft.

Mr. Skrainka and Mr. Bush have applied for a patent on the device and quarrymen who have viewed it in operation are said to have been enthusiastic over its possibilities. In its construction considerable new rope, as well as old cable, was employed. The new rope is B & B plow-steel, supplied by the Broderick & Bascom Rope Co., of St. Louis.



At right—Sketch of the installation.
Below—Hoist and skip discharging to bin.

Wisconsin Crushed-Stone Producer Adds to Screening Facilities

Early in July, 1932, the Waukesha Lime & Stone Co., Waukesha, Wis., installed a new unbalanced type vibrating screen in its sand-and-gravel plant near that city. The screen is a 3 ft. by 8 ft. Type L screen (light-type unit) and was the second of this type to be placed in operation. This particular

New vibrating screen handling washed stone.

unit, while it is suitable for two decks, is being used with one deck as a scalping screen, having wire cloth with 1⅜-in. clear square openings and is efficiently handling a feed of from 50 to 75 tons per hr., feed being washed gravel which has passed a 2½-in. round hole and has been retained on ⅞-in. round-hole plate. When conditions require, the screen can be used as a double-deck unit.

The screen is suspended by four cables and springs which practically eliminate all vibration from the building. It is powered by a 1 hp. motor at 1,800 r.p.m. and is driven through a two-strand texrope drive, the motor being mounted separately on cross-beams from which the upper end of the screen is suspended. The texropes are long enough between centers to take up movement of the screen.

This is the sixth Allis-Chalmers vibrating screen which has been installed by the Waukesha Lime & Stone Co., five other units having been put in operation over a period of two years.

Screening-and-loading building at right, washing building in center, and conveyor from primary crusher at left.

Stone Plant Reverts to Lessor After Highway Contract Is Completed

Unusual Deal Grants Owner of Deposit Title to All Equipment and Structures

By W. E. TRAUFFER

THE erection of an aggregate plant specially to furnish materials for a construction project is a common procedure but it is seldom that such a plant is kept in operation for commercial production after the original project has been completed. This, however, is the case with the crushed-stone plant of the Southern Mineral Co., near Winnfield, La.

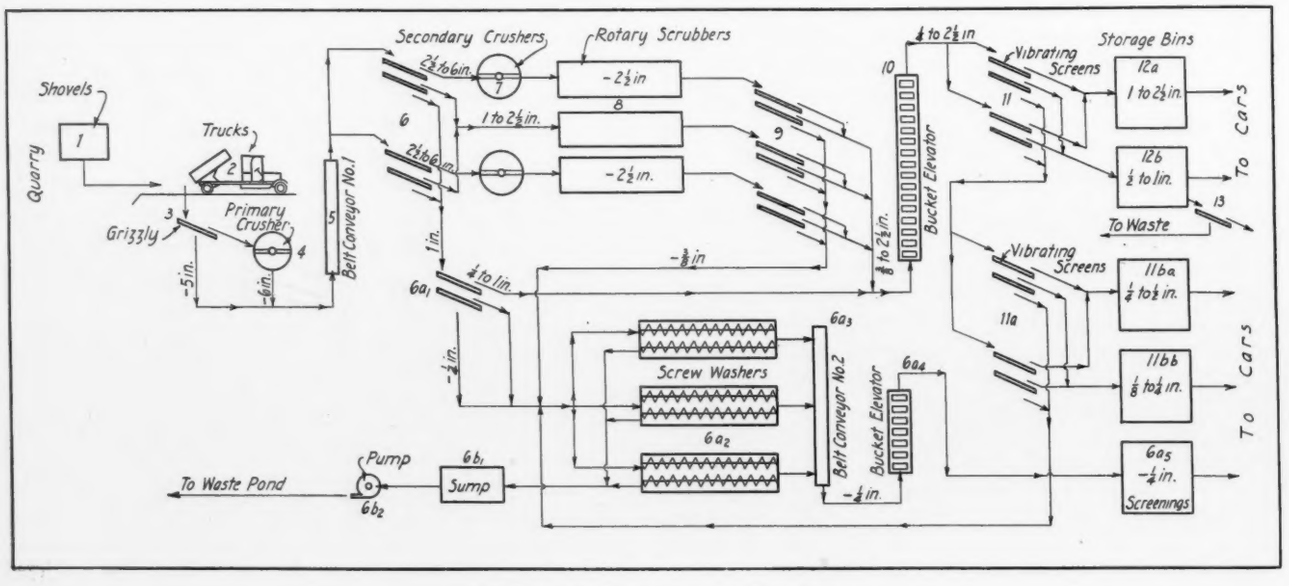
Early in 1931 R. S. Wilson, president of the Big Rock Stone & Material Co., Little Rock, Ark., and A. C. Butterworth, president of the General Material Co., St. Louis Mo., entered into a contract with the Louisiana State Highway Commission to furnish 1,000,000 tons of stone for highway construction within a period of 15 months. The Louisiana Quarry Co., Inc., was then incorporated and a contract consummated with the Southern Mineral Co. for the lease of its property 4½ mi. west of Winnfield, La. On Jan. 19, 1931, construction was started on the plant and on April 26, 1931, it was in full operation.

The conditions surrounding this lease are interesting. As has been stated, the new plant was built by the Louisiana Quarry Co. to fulfill a contract for an extensive highway program of concrete, amiesite and asphalt paving. This is part of the $60,000,000 state road program inaugurated by Louisiana in 1930 and now about three-fourths completed. Under the contract between these two companies the Southern Mineral Co., in return for the stone quarried on its property, became the owner of the plant and all the equipment when the contract was completed on Aug. 12, 1932.

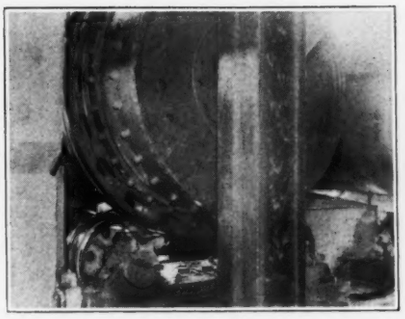
The property consists of 1,710 acres, of which 150 acres are known to have workable limestone deposits. The Southern Mineral Co. built its first crushed-stone plant at this location in 1908. This plant was operated until 1920, when it was leased to the Louisiana Limestone Co. In Dec., 1922, the plant was destroyed by fire. Early the next year the Southern Mineral Co. rebuilt the plant and operated it until 1924, when it was leased for a short time to the Winnstone Products Co. The company

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE PLANT OF THE SOUTHERN MINERAL CO., WINNFIELD, LA.
(Key numbers refer to corresponding numbers on the accompanying flow-sheet.)

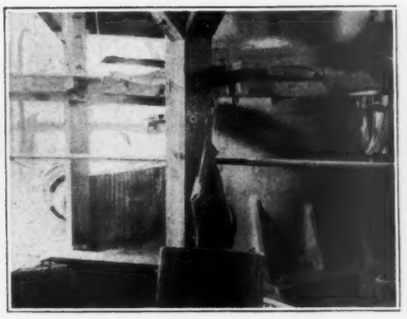
Operation	Key	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Power Transmission
Stripping		Drag-line	Thew	Lorain 75, 1½- cu. yd. Page bucket	Gasoline engine	
		Trucks (3)	Hug	2-cu. yd.		
Drilling		Well-drill Jackhamers	Sanderson Ingersoll-Rand	6-in. Cyclone Jackhamers	Gasoline engine	
Loading and transportation	1 2	Shovels (2) Trucks (5)	Bucyrus-Erie Hug	50B, 2-cu. yd. dippers Roadbuilder, 6-wheel, 4-wheel drives, 12-cu. yd. Easton bodies, Wood hydraulic hoists	Oil-burning steam Gasoline engines	
First scalping	3	Grizzly (Oversize to 4; throughs to 5)		5-in. sloping-bar		
Primary crushing	4	Crusher	Allis-Chalmers	27-in. Gates 12K gyratory	150-hp. Allis-Chalmers motor	Texrope
	5	Belt-conveyor	Stephens-Adamson	36-in., 325-ft. centers	100-hp. Allis-Chalmers motor	Texrope
Second scalping	6	Vibrating screens (2) (Oversize to 7; top-deck throughs to 8; bottom-deck throughs to $6a_1$)	Allis-Chalmers	4-ft. by 8-ft., double-deck	10-hp. Allis-Chalmers motor	Texrope
Secondary crushing	7	Secondary crushers (2)	Allis-Chalmers	10-in. Newhouse	50-hp. Allis-Chalmers motor	Direct
Gravel scrubbing	8 9	Rotary scrubbers (3) Vibrating screens (3) (Oversize and top-deck throughs to 10; bottom-deck throughs to $6a_2$)	Allis-Chalmers Allis-Chalmers	6-ft. by 20-ft. 4-ft. by 8-ft., double-deck	Two 30-hp. Allis-Chalmers motors One 50-hp. Allis-Chalmers motor 7½-hp. Allis-Chalmers motor	Texrope and gear Texrope
	10	Bucket-elevator	Allis-Chalmers	36-in., 76-ft. centers	100-hp. Allis-Chalmers motor	Texrope and gear
Coarse-gravel screening	11	Vibrating screens (2) (Oversize to 12a; top-deck throughs to 12b; bottom-deck throughs to 11a)	Allis-Chalmers	4-ft. by 8-ft., double-deck	7½-hp. Allis-Chalmers motor	Texrope
Coarse-gravel storage	12a 12b 13	Storage-bin Storage-bin Vibrating screen	 Allis-Chalmers	100-ton 100-ton 4-ft. by 8-ft., double-deck	 7½-hp. Allis-Chalmers motor	 Texrope
Fine-gravel screening	11a	Vibrating screens (2) (Oversize to 11ba; top-deck throughs to 11bb; bottom-deck throughs to $6a_3$)	Allis-Chalmers	4-ft. by 8-ft., double-deck	7½-hp. Allis-Chalmers motor	Texrope
Fine-gravel storage	11ba 11bb	Storage-bin Storage-bin		100-ton 100-ton		
Sand separation	$6a_1$	Vibrating screen	Allis-Chalmers	4-ft. by 8-ft., double-deck	7½-hp. Allis-Chalmers motor	Texrope
Sand washing	$6a_3$ $6a_2$ $6a_4$	Screw washers (3) Belt-conveyor Bucket-elevator	Allis-Chalmers Stephens-Adamson Allis-Chalmers	10-in., double-screw 18-in., 30-ft. centers 16-in., 60-ft. centers	Allis-Chalmers motor 15-hp. Allis-Chalmers motor 40-hp. Allis-Chalmers motor	 Texrope and gear Texrope and gear
Sand storage	$6a_5$	Storage-bin		100-ton		
Waste-sand disposal	$6b_1$ $6b_2$	Sump Centrifugal pump	 Allis-Chalmers	Concrete 12-in., abrasion-resisting		
Miscellaneous		Air-compressor	Ingersoll-Rand	Class ER, 12-in. by 10-in.	75-hp. General Electric motor	Belt



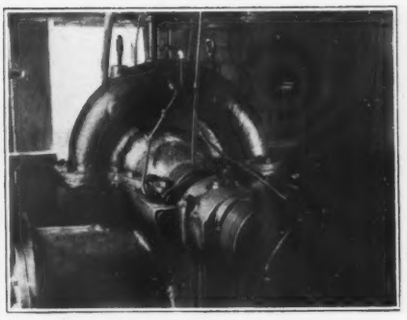
Flow-sheet of operations at the plant.



Feed end of one of the rotary scrubbers.



The 27-in. gyratory primary crusher.



The 12-in. waste-water pump.

again operated the plant until Dec., 1930, when it was leased to the Louisiana Quarry Co. This company immediately abandoned the old plant, which had a capacity of 100 tons per hr. and built the present plant, which has a capacity of 300 tons per hr.

The section of the deposit in which quarrying operations are now being carried on has an overburden of from 4 to 20 ft. of red gumbo clay with occasional small quantities of barium sulphate. The stone is a badly broken bowlder formation with many clay seams and pockets. Test drillings show that the stone deposit varies in depth from 48 to 100 ft. Below the stone is 30 to 40 ft. of gypsum and 325 ft. of anhydrite. At about 400 ft. below the surface is a salt deposit and test holes drilled to a depth of 1,585 ft. have failed to penetrate this. The Carey Salt Co., which is a branch of the Louisiana Development Co., operates on the property a modern salt mine and plant which went into operation late in 1931.

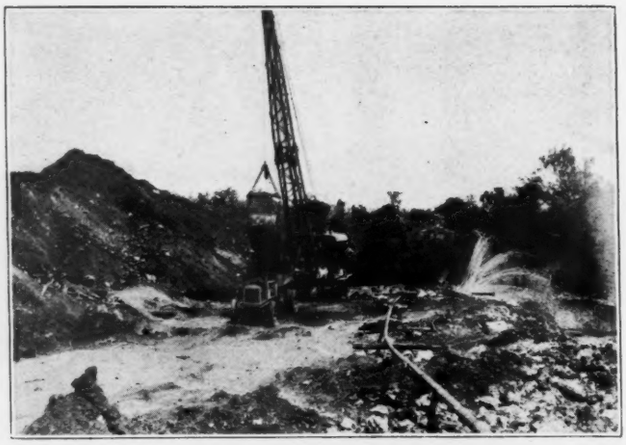
The overburden is being removed by a Thew Lorain "75" gasoline drag-line with a 1½-cu.yd. Page bucket. This loads 3 2-cu.yd. Hug dump trucks which haul to a dump. Stripping is carried on continuously to keep ahead of the quarry operations. Where the clay is found in pockets the drag-line often works for several days to clean out one pocket. A spray from a 6-in. pipe is directed over the face being worked to facilitate loading and the washing of the stone at the plant by loosening the clay.

Drilling is done with a Sanderson Cyclone 6-in. gasoline-driven well-drill. The presence of loose bowlders makes drilling difficult and although many bits are lost only one has not been recovered. From 25 to 40 ft. of hole is drilled daily. Single-row bank shots are made with the holes spaced 15 ft. apart and with a burden of from 15 to 20 ft. at the top of the face. Because of the broken nature of the stone the holes, which average 60 ft. in depth, are loaded entirely in the bottom with from 500 to 700 lb. of explosives. When the bottom is shot out the upper part of the face falls on the top of it with sufficient force at least to separate some of the clay from the stone. From 15 to 20 holes are usually shot at one time. Cordeau-Bickford safety fuse and 40-per cent. low-freezing dynamite are used. Explosives are bought by the carload and are stored in a standard concrete-tile magazine about ½ mi. from the quarry.

Because of the comparatively small size of the primary crusher at the plant considerable secondary drilling and blasting are necessary. Mud-capping is also resorted to when the work is hurried, Ingersoll-Rand Jackhammers being used for this purpose. Stone is loaded by two Bucyrus-Erie 50-B oil-burning steam shovels fitted with crawler treads and 2-cu.yd. dippers. These load five Hug Road-builder trucks equipped with 12-cu.yd. Easton heavy-duty, end-dump, steel bodies fitted with Wood hydraulic hoists. These are 6-wheel trucks with four drive wheels and solid tires all around. They have 12 speeds forward and 3 reverse. These trucks have given very satisfactory service under unusually severe operating conditions and the company management thinks them ideal for this type of

A general view of the quarry showing two shovels loading trucks. Drag-line above stripping overburden.

One of the two shovels loading stone to one of the heavy-duty trucks for haulage to the plant.



The drag-line loading overburden to truck. Note sprays for preliminary washing of stone at right.

work. These 5 trucks have handled over 1,000,000 tons of stone with almost no trouble. The round trip to the plant is at present about ½ mi., and 5 to 6 trips per hr. are made by each truck. In an average 10-hr. day about 262 loads are hauled. The truck drivers are protected by steel canopies of the company's own design which are placed over their seats and have already prevented a number of accidents in loading.

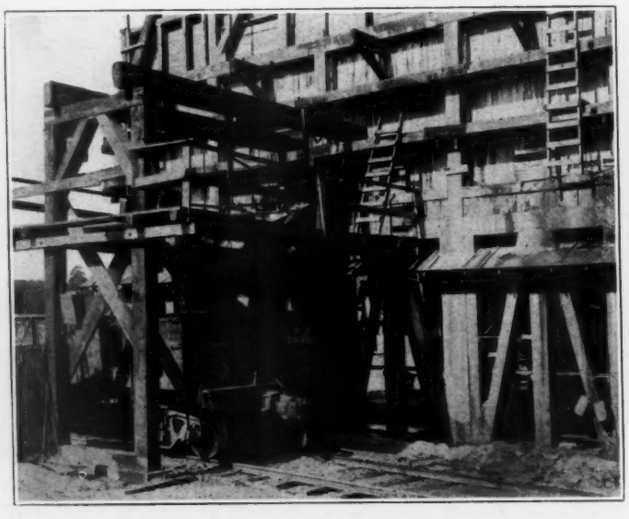
The trucks run up a 360-ft. timber ramp to a height of 30 ft. at the primary-crusher building. They discharge their loads between the treads of the ramp over a 5-in. sloping-bar grizzly directly into the 27-in. Allis-Chalmers 12K Gates gyratory crusher. A stream of water flowing on the stone coming over the grizzly helps to loosen the clay. Occasionally a bowlder too large for the crusher will be brought from the quarry. A stone hook operated by a Curtis air-hoist removes the stone to a pile alongside the crusher building. When a quantity of the bowlders have accumulated they are drilled and broken and rehandled to the crusher.

The crusher is set to produce 6-in. material which, together with the throughs from the grizzly, goes to the main belt-conveyor leading to the washer building. This conveyor (No. 1) has a slope of 17 deg., is 36 in. wide and operates on 325-ft. centers. It discharges through a split chute to two Allis-Chalmers 4-ft. by 8-ft. double-deck vibrating screens having 2½-in. openings on the top deck and 1-in. on the bottom deck. The material retained on the top deck goes to two 10-in. Allis-Chalmers Newhouse crushers which are set at 2½ in. Each of these feeds one of three 6-ft. by 20-ft. Allis-Chalmers rotary scrubbers. The material retained on the lower deck of the scalping screens (1 to 2½ in.) goes to the third scrubber.

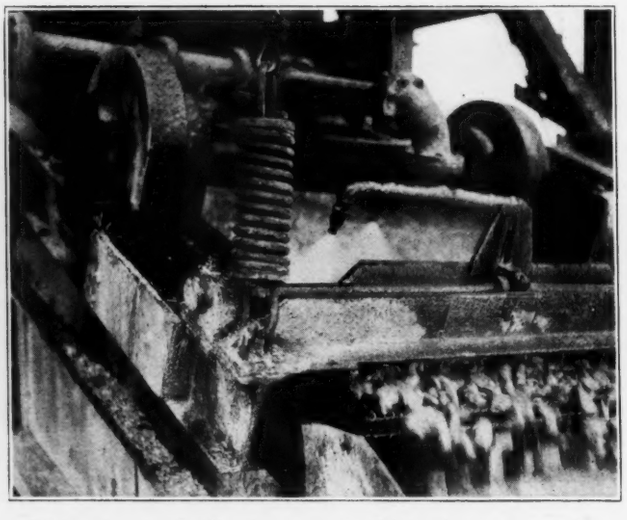
The fine material (1-in. minus) coming from the scalping screens is chuted to a 4-ft. by 8-ft. Allis-Chalmers double-deck vibrating screen provided

Loaded truck on ramp from quarry to primary-crusher building.

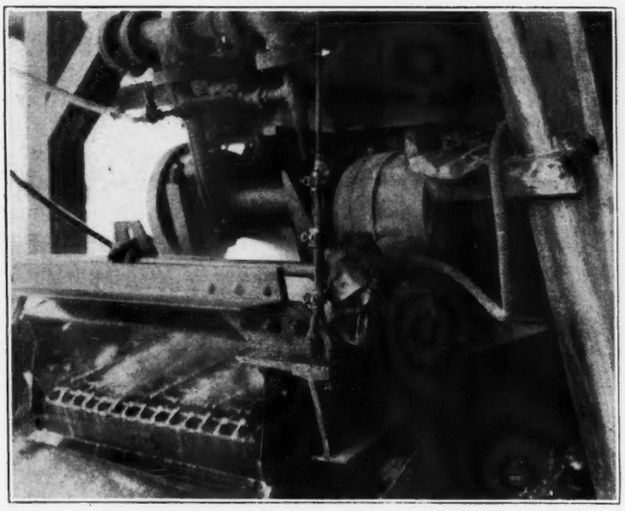
with ¼-in. openings on both decks. The ¼-in. minus material goes to three Allis-Chalmers 10-in. double-screw washers, the overflow from which goes to a concrete sump whence it is rehandled by a 12-in. Allis-Chalmers centrifugal pump fitted with special abrasion-resisting runners. This pumps the overflow a distance of 500 ft. to a natural drainage ditch leading to the lake from which the wash-water supply is obtained. The washed material from the screw-washers is fed by an 18-in. belt-



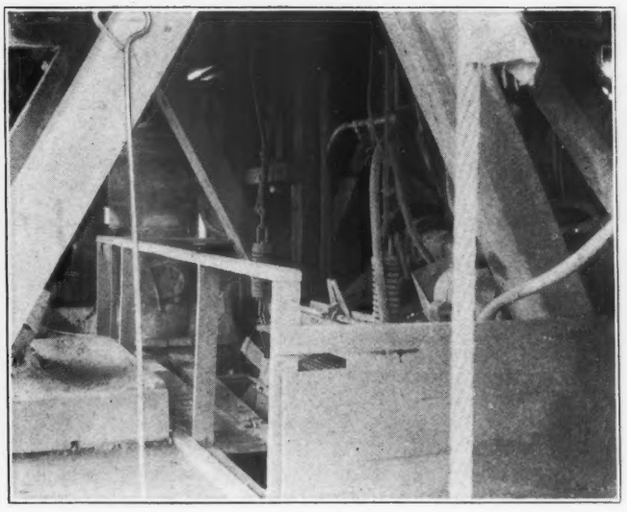
Stored stone being re-rinsed before loading in cars for shipment.



View of one of vibrating screens. Note the spray-nozzles.



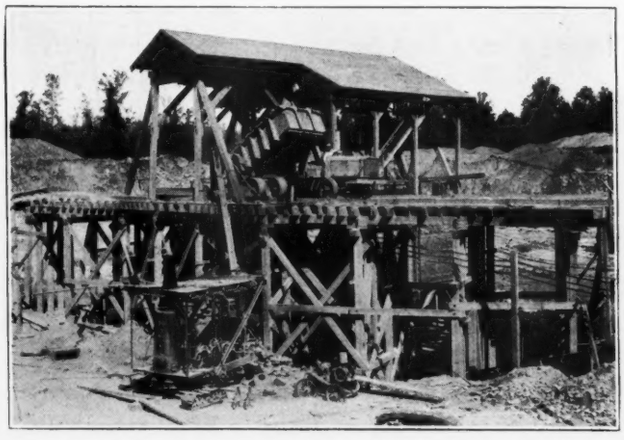
Another of the washing screens with spray-nozzles in operation.



One of the secondary crushers; vibrating screen at right.

conveyor (No. 2), operating on 30-ft. centers, to a 16-in. belt-bucket-elevator which is set on 60-ft. centers and feeds a screenings bin in the screening building.

The three rotary scrubbers discharge to three 4-ft. by 8-ft. Allis-Chalmers double-deck vibrating screens fitted with 1-in. and ⅜-in. openings. Sprays flowing on these screens insure the effective removal of the fines, which are chuted to the screw-washers. The material retained on these screens, ⅜ to 2½-in., together with that retained on the



Truck on ramp from quarry discharging to primary crusher.

fines scalping screen, ¼ to 1-in., is chuted to a 36-in. belt-bucket-elevator which runs on 76-ft. centers and raises it to the top of the screening building.

The elevator discharges through a split chute to two Allis-Chalmers 4-ft. by 8-ft. double-deck screens provided with 1-in. and ½-in. openings on their top and bottom decks respectively. The 1-in. to 1½-in. and ½-in. to 1-in. sizes are chuted to bins. The material passing through the bottom decks (½-in. minus) goes to two 4-ft. by 8-ft. double-deck screens having ¼-in. and ⅛-in. openings. The ¼ to ½-in. and ⅛ to ¼-in. sizes go direct to bins. The material passing through the lower decks (⅛-in. minus) of these screens is flumed with the water back to the screw-washers.

The bin structure supporting the screening building consists of five 100-ton timber bins cross-braced with steel tie-rods. They are in a single row over a loading track and discharge through lever-controlled arc gates into cars for shipment. Each gate has a perforated loading chute and a Binks spray nozzle for a final rinse before loading. The 1-in. stone bin also has a side gate feeding a 4-ft. by 8-ft. Allis-Chalmers double-deck vibrating screen. Only one deck with ⅛-in. cloth is being used. Sprays rinse the material before it is loaded into cars on a siding alongside the plant.

As the state highway construction program has been going ahead slowly for some time, pending the sale of the remainder of the bonds issued to finance the work, most of the stone produced during the last few months of operation on this contract was stock-piled to await the resumption of activities. The loaded cars were hauled by steam locomotives to stock-piles near the plant where they were unloaded by two Thew Lorain gasoline cranes. As the contract stipulated that the stone became the property of the state as soon as it was loaded into cars, the rehandling expense is borne by the state.

Most of the stone is being used in the northern half of the state, although some has been shipped

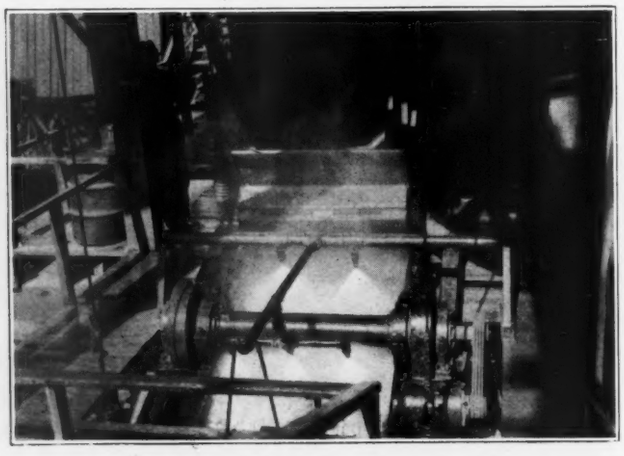
Stone being sprayed as it passes over grizzly to primary crusher.

Two of the three screw washers used for washing fines.

as far south as Baton Rouge. Shipments are made over a 2½-mi. siding connecting with the L. & N. Ry. The building of this rail connection and other stripping and grading work was done by the Gifford-Hill Co. Material stripped from the deposit was used for the railroad fill.

The timber ramp leading up from the quarry to the plant at first was quite a problem. Because of the wet clay in the quarry the trucks soon made the ramp so slippery that it was almost impossible for them to climb it. This difficulty was overcome by inserting a steel grating in the runways for a short distance at the quarry end. This allowed the clay dragged up from the pit on the truck wheels to drop out of the way, thus keeping the remainder of the ramp comparatively dry and clean. Another 130-ft. ramp leads from the crusher back into the quarry so the trucks can operate in a continuous circuit.

Electrical power for the plant is received at 13,000 v. from the Sterlington, La., steam generating plant of the Louisiana Light & Power Co., 72 mi. away. Connections with other generating plants insure against power failure. An outdoor substation at the plant reduces the incoming current to 440 v. for all the plant motors and to 110 v. for the lights.



One of the washing screens in operation.

Because of the seasonal variation in rainfall in this section of the state—the fall being heavy in the spring and autumn and very light at other times—an artificial lake was formed near the plant to insure a constant water-supply. This was made by using the railroad fill to dam up a creek, the result being a 600-acre lake. A 100-ft. timber spillway controls the water level. A 14-in. Allis-Chalmers centrifugal pump at the lake feeds a timber flume which lets the water flow by gravity to five 12,000-gal. water-tanks at the plant. An Allis-Chalmers 10-in. two-stage centrifugal pump supplies the plant washing system. A 6-in. low-pressure pump is used to prime the large pump and also furnishes water for the screw-washers and rotary scrubbers which are at a low elevation. About 4,000 gal. per min. is required for washing at the plant alone. An 8-in. Allis-Chalmers centrifugal at a sump in the quarry supplies 1,000 gal. per min. for the sprays at the quarry face. Another 8-in. pump removes excess water from this sump to the lake and a 12-in. by 14-in. pump, belt-driven by a 150-hp. G. E. motor, is used to drain the quarry in wet weather. An 8-in. pump drains the conveyor pit at the screw-washers.

Binks spray nozzles are used wherever washing is done. From 3 to 6 nozzles are used on each screen and on each of the rinsing chutes. A much cleaner product is obtained than was formerly possible with the use of perforated or slotted pipes.

Most of the repair work is done at the plant. A blacksmith shop alongside the washer-building contains a forge, emery wheel, drill-press, lathe, and other minor equipment. All these machines are driven from a line-shaft by an electric motor. An Ingersoll-Rand Class ER1, 12-in. by 10-in. air-compressor in this building furnishes air for secondary drilling, crusher hoists and for pumping fuel oil for the quarry shovels. The company also has arc-welding and acetylene-welding equipment.

The plant was designed by the Allis-Chalmers Mfg. Co., which furnished most of the equipment, and was erected by the Carmichael-Cryder Co. which also installed all the equipment. All footings and crusher foundations are of concrete and the superstructure is of timber.

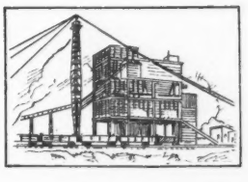
All the screens except one, and all the scrubbers, bucket-elevators, screw-washers, crushers, pumps, and most of the motors were furnished by the Allis-Chalmers Mfg. Co. The Stephens-Adamson Mfg. Co. supplied the rinsing screen, and all the conveyor idlers and bin gates. Goodyear conveyor belting is used. The screen cloth on the vibrating screens was furnished by the Ludlow-Saylor Wire Co. and the Manganese Steel Forge Co. All the conveyors and elevators have ratchet stops to insure against reversal under load. The long belt-conveyor has a gravity take-up and the idlers have Timken roller-bearings.

The offices of the Southern Mineral Co. are at New Orleans, La. The officers are: I. L. Lyons, Jr., president; Warren Kearney, vice-president; Geo. J. Lyons, secretary and treasurer; and J. F. Coleman, vice-president.

MEN OF THE INDUSTRY

SAMUEL F. GEHRET

MR. GEHRET is the concrete engineer in charge of design, testing and delivery of central-mixed concrete for the Camden Lime Co., of Camden, N. J. He joined the company's forces after having served as superintendent of streets of the city of Camden for a period of seven years. Previous to that time he was employed in the field of bridge and general-building construction. The Camden Lime Co., in addition to its concrete-batching business, deals in building supplies of all kinds, maintaining four yards and wharves.



Personal Mention

J. B. Maxfield, general manager of the Inkom, Ida., plant of the Idaho Portland Cement Co., since its erection several years ago, has resigned his position. His successor has not been appointed but temporary management of the plant has been placed in charge of **Raymond Enloe,** secretary-treasurer of the firm. Mr. Enloe is a son of Eugene Enloe, of Spokane, Wash., president of the company.

Hon. William T. Gardiner, governor of Maine, paid a business visit to Seattle, Wash., and the Pacific Northwest in September. Gov. Gardiner is chairman of the board of the Pacific Coast Cement Co., whose plant at Seattle is being operated under lease by Superior Portland Cement, Inc.

F. L. Swinton, for several years connected with the Basalt Rock Co., at its offices at Sacramento, Cal., has been made sales manager of the company and will make his headquarters at Napa, Cal. The post is one newly-created by the company following the opening of its plant at Healdsburg.

A. J. R. Curtis, assistant to the general manager, Portland Cement Assn., made the presentation speech at the formal dedication of the Portland Cement Assn. safety trophy at the plant of the Southwestern Portland Cement Co. at Osborn, O., on September 17.

Howard H. Leh, general manager of the Keystone Portland Cement Co. at Bath, Pa., addressed the Kiwanis Club of Harrisburg, Pa., at one of its recent luncheons, explaining the manufacture of cement.

Mrs. Oscar Anderson has disposed of her quarry located at Rocklin, Cal. Guy F. Atkinson & Co. was the purchaser.

W. H. Warford, formerly manager of the western construction division of Gifford-Wood Co., has been made manager of the entire western division. Mr. Warford has numerous acquaintances throughout the middle west. Prior to his coming to Gifford-Wood Co. he headed his own company, doing a large annual volume in construction work which was noted for its thoroughness and completeness of detail. Mr. Warford replaces W. H. Towne who is widely known in the ice industry and who will specialize in Gifford-Wood equipment for that industry in the future.

W. H. Warford.

Harvey LeFevre, formerly sales manager of the H. K. Porter Co., Pittsburgh, has joined the forces of the Heisler Locomotive Works, Erie, Pa.

H. J. Lyons, formerly connected with the headquarters promotional staff of the Portland Cement Assn. has been placed in charge of the association's activities in northern Iowa with the title of field engineer. Mr. Lyons will work in coöperation with **W. H. Steiner,** district engineer at Des Moines. He will have charge of developments in the three northern tiers of counties in the state.

H. H. Elmire, until recently in charge of the New York district office at Arlington, N. J., of the Keystone Driller Co., has been promoted to field engineer for the company, with headquarters at Beaver Falls, Pa. **James Shearer** has been selected to take his former place as district manager at Arlington.

Obituary

George S. Earnshaw, a brother of F. O. Earnshaw, president of the Carbon Limestone Co. of Youngstown, O., died recently. Mr. Earnshaw operated quarries in Georgia and Illinois many years ago and of late had been connected with the sales force of the Illinois Powder Co. He was 68 years old.

H. M. Rigg, 33, operating superintendent of Acme Limestone Co., Alderson, W. Va., died September 18. He had been with the company 16 years, starting as payroll clerk, and was a member of the board of directors. Besides his parents, his wife and two children he leaves several sisters and brothers, including J. A. Rigg, general manager of the company.

John W. Dickinson, 80 years old, at one time engaged in the manufacture of cement and a brother of T. G. Dickinson, president of the Marquette Cement Manufacturing Co., of Chicago, was fatally injured September 26 in an automobile accident at King City, Cal. About 15 years ago Mr. Dickinson severed his connections with the cement industry and went to Scarsdale, N. Y., where he engaged in the banking business.

Coming Events

October 3-7, 1932. Washington, D. C. Twenty-first Annual Safety Congress, National Safety Council. W. H. Cameron, secretary, 20 N. Wacker Drive, Chicago, Ill.

October 5-8, 1932. Atlantic City, N. J. Fall meeting, American Society of Civil Engineers.

November 14-18, 1932. Washington, D. C. Annual meeting, American Assn. of State Highway Officials.

December 5-9, 1932. New Orleans, La. Tenth Annual Asphalt Paving Conference and annual meeting, Assn. of Asphalt Paving Technologists. Under auspices of Asphalt Institute, 801 Second Ave., N. Y.

December 5-10, 1932. New York, N. Y. Tenth National Exposition of Power and Mechanical Engineering. Under management of International Exposition Co., Grand Central Palace. New York, N. Y.

December 7-9, 1932. Washington, D. C. Annual meeting, American Institute of Chemical Engineers.

Jan. 16-20, 1932. Detroit, Mich. Highway and Building Congress. Annual Conventions and Combined Show of National Crushed Stone Assn. (Jan. 16-18), National Sand & Gravel Assn. (Jan. 17-18), and National Ready-Mixed Concrete Assn. (Jan. 18), Book-Cadillac Hotel.

February 20-23, 1933, Chicago, Ill. Twenty-ninth annual convention, American Concrete Institute. Harvey Whipple, secretary, 2970 W. Grand Blvd., Detroit, Mich.

Traffic News and Comment

Recent I.C.C. Decisions

Fluorspar.—The rates on fluorspar in carloads ex-river from ports on the Ohio and Monongahela Rivers to destinations in Ohio, Pennsylvania and West Virginia range from 46 to 56 per cent. of sixth class and from 13 to 16 per cent. of first class. Carriers published increased rates which were approximately 75 per cent. of sixth class and 21 per cent. of first class. These rates were suspended at the request of steel companies and fluorspar mines in Kentucky and Illinois. The Commission has found that the carriers have justified the proposed rates and have vacated the suspension. This is a case in which the traffic will bear a greater rate. The cost of fluorspar in a ton of steel, even if the fluorspar were valued at $20.00 per ton, would amount to only 8 c. C. C. I. & S. Docket No. 3,699, Fluorspar, ex-river to Ohio and Pennsylvania.

New Complaints Filed

Crushed Asphalt Rock.—New rates and reparation are sought on an allegation of unreasonable rates and charges on crushed asphalt rock from Dougherty, Okla., to Blythedale and Trenton, Mo., and Manhattan, Kan. I. C. C. Docket No. 25,480, Carter-Waters Corp., Kansas City, Mo., v. A. T. & S. F.

Dolomite.—Complainants allege the rates on dolomite and dolomitic limestone from West Stockbridge and Ashley Falls, Mass., to East Hartford, Conn., are in violation of section 6, and ask for new rates and reparation. I. C. C. Docket No. 25,481, Olds & Whipple, Inc., Hartford, Conn., v. New Haven.

Sand.—Reparation is sought on an allegation of unreasonable rates on sand from Mapleton Pa., to Irondale and New Salisbury, O. Complainant also alleges that rates are prejudicial with shippers at Fallston, Monaca, Vanport, New Brighton, Fetterman, Pa., Niles and Toronto, O., New Cumberland, Globe and Kennilworth, W. Va., preferred. I. C. C. Docket No. 25,498, The McLean Fire Brick Co., Pittsburgh, Pa., v. Pennsylvania.

Rate-Committee Dockets

Consolidated Classification Committee

Mica.—It is proposed by carriers to change the classification on mica as it appears on page 386 of consolidated classification No. 7 by changing Item 17 to read: "Mica, see Note:"; and by eliminating Items 18 and 22 and substituting therefor, "Crude, Scrap, Waste or Crude Mica Ore: In bags, barrels or boxes, L. C. L. Official 4, Southern 4, Western 4; In packages or in bulk, c. l. min. wt. 40,000 lb., Official 6, Southern 6, Western B, and by changing Item 23 to read, "Note—Ratings apply on Mica which has value for grinding or pulverizing only." Docket No. 85.

Poultry Grit.—Shippers in Southern Classification territory propose that the rating on poultry or pigeon grit in southern classification as published in Item 12, p. 457, in bulk in bags, barrels or boxes, L. C. L., be changed from 5th class to Class D or 10. Docket No. 189.

Rule 40.—Specifications for single, double and multi-wall paper bags are included in Section 10 (c) of this rule, which will be furnished on request. Docket No. 194.

New England Freight Assn.

Amiesite.—Shippers propose a reduction on amiesite or crushed stone coated with oil, tar or asphalt[1] from Winchester to Worcester, Mass., from $1.00 to 94 c. per net ton. Docket No. 26,596.

Lime and Limestone.—The Rutland Railroad proposes to revise descriptions and rates on lime and milestone shown in their I. C. C. No. 5,724, to conform with the general lime adjustment agreed to in 1931. Also, to reduce rates to Brooklyn and lighterage points so as not to exceed the New York City rates by more than 3 c. on lime and 2 c. on limestone. Exhibit showing proposed changes will be furnished on request. Docket No. 26,542.

Trunk Line Assn.

Cement.—Carriers propose to publish a rate on cement, c. l. min. wt. 50,000 lb., from Buffalo, N. Y., to Gauley, W. Va., of 18½ c. per 100 lb. Docket No. 29,762, Sup. 1.

Carriers propose publication of the following rates on cement, c. l. min. wt. 50,000 lb.: from Security and Union Bride, Md., Kushequa, 16 c., stations Guffey to Olivedale, 18 c.; from York, Pa., to Kusequa, 15½ c., stations Guffey to Olivedale, 17 c. per 100 lb. Docket No. 29,676, Sup. 1.

Shippers at Alsen, N. Y., are proposing a line of rates on cement, c. l. min. wt. 50,000 lb., on the same basis as reflected in rates from the Lehigh district. A complete exhibit will be furnished on request. Docket No. 29,-854.

Lime.—Shippers at Glens Falls, Smiths Basin, Chazy, N. Y., and West Rutland, Vt., are proposing rates on agricultural and fluxing lime, c. l. min. wt. 50,000 lb., to D. L. & W. stations, based on 80 per cent. of the regular lime rates. Docket No. 29,866.

Poultry Grit.—Shippers propose establishment of class 20 (20 per cent. of first class) on poultry grit, c. l. min. wt. 50,000 lb., between all points in trunk line territory, and from trunk line to C. F. A. and N. E. F. A. territories. Docket No. M-3097.

Roasted Dolomite.—Carriers propose to reduce the rate on dead burned or calcined magnesite or dolomite from Marelan, Que., to Johnstown, Pa., from 43½ c. to 41 c. per 100 lb. Docket No. 29,821.

Shippers at Bluebell and Williams, Pa., propose the establishment of a rate on roasted dolomite[2] to Oakmont and Vernon, Pa., of $2.24 and to Bridgeville and Carnegie, Pa., of $2.54 per gross ton. Docket No. 29,825.

Sand and Gravel.—Carriers propose a rate on sand and gravel from Cape May, N. J., to St. Jerome, Que., of 30¾ c. per 100 lb. The present rate is 44 c. Docket No. 29,841.

Slag.—Shippers propose a rate on slag[1] from Johnstown, Pa., to Gray, Pa., of 80 c. per ton to expire in six months. Docket No. 29,845.

Central Freight Assn.

Crushed Stone.—Shippers are proposing a line of rates on crushed stone, agricultural limestone and related articles from Woodville and Gibsonburg, O., to destinations in Michigan. Representative proposed rates in Docket No. 32,974, are:

To	From Woodville	From Gibsonburg
Clare	$1.45	$1.55
Beulah	1.85	1.95
Battle Creek	1.45	1.45
Shoup	1.17	1.17
Lum	1.25	1.25
Cass City	1.35	....
Cassopolis	1.45	1.45
Three Rivers	1.40	1.45
Auburn	1.45	1.45
Allen	1.07	1.07
Dundee	.97	1.02
Morenci	.92	.97
Big Rapids	1.85	1.85
Cadillac	2.05	2.05

Reduced rates on crushed stone are proposed by shippers as shown below, column 1 applying from Genoa and Martin, O., 2 from Marblehead, O., and 3 from Sandusky, O.

To	(1)	(2)	(3)
Minerva, O.	$1.35	$ ...	$ ...
Watheys, O.	1.35	1.25	...
Dillonvale, O. (NYC)	1.45	1.35	...
Scio, O.	1.35	1.25	1.25
Unionvale, O.	1.45	...	1.25
Neffs, O.	1.55	1.45	1.35
Dillonvale, O. (WLE)	1.45	1.35	1.35
Tiltonville, O.	1.45	1.45	1.35
Martins Ferry, O.	1.55	1.45	1.35
Steubenville, O.	1.55	1.45	1.45

Reductions in the rates on crushed stone from Alsace, Pa., to Sugar Creek, Carleton, Utica and Cochranton, to $1.00 and to Meadville, Pa., to $1.10 per net ton are proposed by shippers. Docket No. 33,042.

A reduction in the rate on crushed stone[1] from Sandusky, O., to Mansfield, O., via the B. & O., from 70 c. to 50 c. per ton is proposed by shippers. Docket No. 33,083.

Roasted Dolomite.—A reduction in the rate on roasted dolomite from Narlo, O., to Houghton and Coles

Creek, Mich., from $9.40 to $5.60 per net ton is proposed by shippers. Docket No. 32,910.

Sand.—Carriers propose the publication of a rate of $1.80 per net ton to apply on industrial sands from Conneaut, O., Fairview, Swanville, Erie, Wesleyville, Harbor Creek, Morehead and Northeast Pa., State Line, Ripley and Forsythe, N. Y., to Medina, Batavia and Rochester, N. Y. At present various rates ranging from $2.39 to $2.52 per ton apply. Docket No. 32,950.

Establishment of a commodity rate on silica sand, gravel or granules, c. l. min. wt. 60,000 lb., from Lac Remi, Que. to Chicago, Ill., of $6.40 per net ton is proposed by carriers. Class rates now apply.

The following rates on common sand in open top cars to stations on the B. & L. E. from Conneaut Harbor O., are proposed by shippers: Albion, 60 c.; Argentine, Branchton, $1.00; Butler, $1.10; Conneaut, Conneaut Lake Park, Erie, 70 c.; Fredonia, 90 c.; Goff, $1.00; Greenville, 80 c.; Grove City, 90 c.; Henlein, 80 c.; Hilliards, $1.00; Kremis, 80 c.; Jamisonville, $1.00; Linesville, 70 c.; Meadville, 80 c.; Mercer, 90 c.; Platea, 60 c.; Queen Jct., $1.10; Rockdale, $1.10, and to Shermansville, Pa., 70 c. per net ton. Docket No. 32,963.

Shippers propose a reduction in the rate on industrial sands from Phalanx O., to Flint, Mich., from $2.65 to $2.20 per net ton. Docket No. 33,003.

Sand and Gravel.—Carriers propose to reduce the rate on sand and gravel from Brown's Siding, O., to Neward, O., from 70 c. to 40 c. per net ton. Docket No. 32,930.

Waste Stone.—Shippers propose a reduction in the rate on waste stone[1] in open top cars from I. C. R. R. stations, Bloomington, Clear Creek, Quarry Jct., Dodgson and Victor, Ind., to Springfield, Ill., from $1.39 to $1.19 per net ton. Docket No. 32,874.

Illinois Freight Assn.

Crushed Stone.—It is proposed to reduce the rates on crushed stone and related articles[1] from Lehigh, Vans Siding and West Kankakee, Ill., to Bonfield, Essex and Coster, Ill., from 70 c. to 45 c. per net ton, and to Gardner, Booth, Mazon, Wauponsee, Laugham and Seneca, Ill., from 76 c. to 45 c. per net ton. Docket No. 6,836.

Sand and Gravel.—Commodity rates on sand and gravel from Allison Branch, Ill., to various points have been proposed where class rates now apply. Representative proposed rates are: to Huegely, Oakdale and Sparta, $1.13; to Mo.-Ill. Shops, Collins and Chester, $1.26 per net ton. Docket No. 6,827.

Proposed reduced rates on sand and gravel from Elco, Ill., in Docket No. 5,963, are:

To	Present	Proposed
Cayce, Ky.	$0.90	$0.80
Trenton, Tenn.	1.10	1.00
Gilmore, Tenn.	1.20	1.10
Ramer, Tenn.	1.35	1.30

Western Trunk Line Committee

Agricultural Limestone.—Crushed stone, sand and gravel rates now apply on agricultural limestone from Weeping Water, Neb., to C. B. & Q. stations in northwest Missouri and Wabash stations in Missouri as far south as Conception. It is proposed to establish new rates on this commodity[1] based on the following mileage scale which will result in reductions of from 10 c. to 70 c. per ton. Docket No. 496-T.

Miles	Rate	Miles	Rate	Miles	Rate
40	$0.59	120	$1.02	190	$1.31
50	.63	130	1.07	200	1.35
60	.67	140	1.11	210	1.38
70	.71	145	1.13	220	1.41
80	.76	150	1.15	225	1.44
90	.82	160	1.19	230	1.44
100	.88	170	1.23	240	1.47
110	.96	175	1.25	250	1.50
115	.99	180	1.27	...	...

Crushed Stone.—It is proposed to publish a rate of 18½ c. per 100 lb., on crushed or broken limestone, c. l. min. wt. 60,000 lb., from Inland Jct., Mich., to Keokuk, Ia. Docket No. 1,601-E.

Gypsum Rock.—A commodity rate on crushed gypsum rock[1] from Fort Dodge, Ia., to Louisville and Kosmosdale, Ky., of 21½ c. per 100 lb., has been proposed. Docket No. 2,090-G.

Lime.—Shippers propose the establishment of a rate of 13 c. per 100 lb., on lime, c. l. min. wt. 70,000 lb., from Sequiota, Springfield and Ash Grove, Mo., to Louisville, Neb. The present rate is 16 c., c. l. min. wt. 30,000 lb. Docket No. 5,071-E.

Southern Freight Assn.

Cement.—It is proposed to establish a reduced rate of 68½ c. per 100 lb., on cement, c. l. min. wt. 60,000 lb., from Leeds, Ala., to Rate Bases 1, 2 and 3 points in Agent Toll's I. C. C. Nos. 1,296 and 1,299. Docket No. 59,-100.

Lime.—At the request of shippers for commodity rates, carriers suggest the establishment of rates on agricultural and chemical lime, c. l. min. wt. 50,000 lb., from Sherwood, Tenn., to destinations in the state of Ohio made on the basis prescribed by the Commission in Docket No. 16,170. Docket No. 59,164.

Talc.—In lieu of class or combination rates now applicable, it is proposed to establish 17½ per cent. of first class on talc refuse or waste, crude, crushed, ground, powdered or pulverized, c. l. min. wt. 60,000 lb., between points within Southwestern and Kansas-Missouri territories and from defined territories to Southwestern and Kansas-Missouri territories. Docket No. 59,066.

Combination Tariff.—It is proposed to cancel Agent B. T. Jones' Tariff No. 228, I. C. C. U. S. 1, and all reference thereto in other tariffs applying from, to and between points in the United States. Especial attention is directed to Interstate Commerce Commission's Circular of July 22, 1932, reading in part as follows: Shippers who object to cancellation of the rule without the publication of additional joint or proportional rates should, on or before Oct. 15, 1932, furnish publishing carriers and agents a list of the tariffs now subject to the rule under which shipments are moving, indicating what additional rates they believe should be published, forwarding copies thereof to the Commission and to Agent Jones. Shippers who object to the cancellation should file their objections in writing with the chairman of the Southern Freight Assn., in Atlanta, Ga. Docket No. 59,119.

Southwestern Freight Bureau

Lime.—Claiming it is all the traffic will bear, shippers at New Braunfels, Tex., propose that the rate on lime, c. l. min. wt. 30,000 lb., be reduced from 44½ c. to 30 c. per 100 lb. Docket No. 25,644.

Plaster and Cement.—Shippers at Portland and Concrete, Colo., are asking for the establishment of a rule allowing the shipment of mixed cars of plaster and cement at the higher rate and higher min. wt. applicable to the commodities involved, to points in S. W. L. Tariff 14-0, and A. T. & S. F. Tariff 6,461-I.

Sand.—Shippers of silica sand at Ottawa, Utica, Wedron, Millington, Sheridan and Oregon, Ill., propose establishment of rates on that commodity[1] based on the scales prescribed in I. C. C. Docket No. 17,000 Part 11-A, extending the box car scale beyond 1,000 miles and the open top car scale beyond 800 miles at the rate of 10 c. for 50 miles; origins and destinations to be grouped using the average distances in making rates. Docket No. 25,615.

Sulphur.—Shippers have proposed rates on ground or refined sulphur, c. l. min. wt. 40,000 lb., to Ogton, Ogton Sugar Works and Sugarton, Utah and McMillan, Idaho, a rate of 74 c. per 100 lb., from Texas producing points on the Mo. Pac., G. C. & S. F., and T. & N. O., and a rate of 77 c. per 100 lb., from Byram, Tex., based 9 c. over the rates on crude sulphur. Docket No. 25,551.

Transcontinental Freight Bureau

Plaster and Plasterboard.—Shippers request that Items 4,490 and 4,491 of Tariffs 1-L and 4-I be amended to permit unloading in transit as per individual lines' tariffs. Docket No. 14,207.

Silica Sand.—Shippers propose a rate on silica sand and silica flour, c. l. min. wt. 100,000 lb., from Group D and west of 40 c. to be published in Tariffs 1-L and 4-I. Docket No. 14,-206.

[1] The carload minimum weight will be 90 per cent. of the marked capacity of car, except when loaded to full cubical or visible capacity, actual weight will apply.

[2] The carload minimum weight will be the marked capacity of car, except when loaded to full cubical or visible capacity, actual weight will apply.

Latest Portland-Cement Statistics

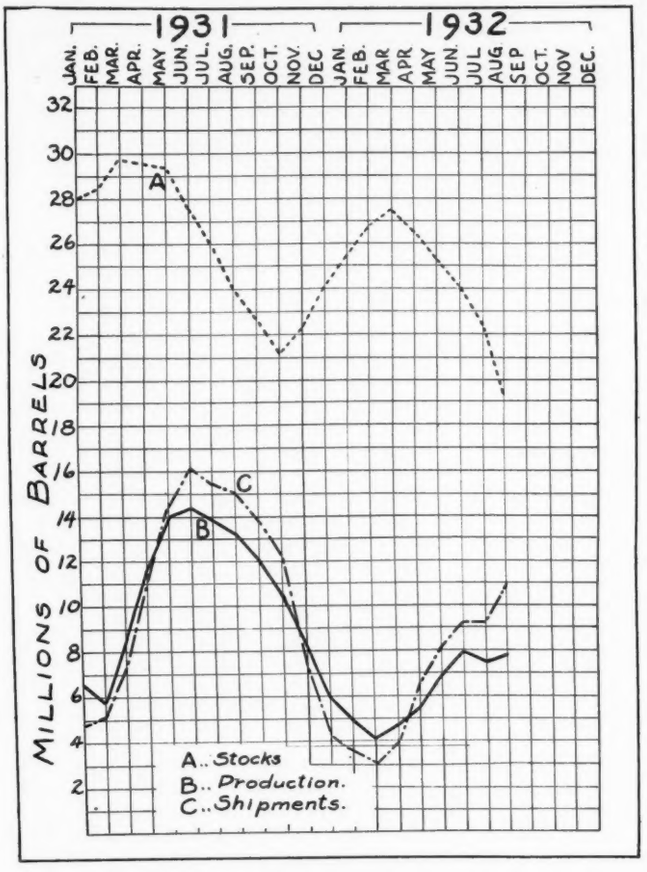


Chart showing monthly production, shipments and stocks on hand at end of month, from January, 1931, to August, 1932.

THE Portland-cement industry in August, 1932, produced 7,835,000 bbl., shipped 10,968,000 bbl. from the mills, and had in stock at the end of the month 19,379,000 bbl. Production of Portland cement in August, 1932, showed a decrease of 42.2 per cent. and shipments a decrease of 27.7 per cent., as compared with August, 1931. Portland cement stocks at mills were 20.3 per cent. lower than a year ago. The statistics here given are compiled from reports for August, received by the Bureau of Mines, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns.

In the statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of August, 1932, and of August, 1931.

DISTRIBUTION OF CEMENT

Shipped to—	June		July	
	1931	1932	1931	1932
Alabama	138,369	30,451	90,757	26,937
Alaska	1,100	2,689	2,716	2,442
Arizona	41,110	16,050	41,979	13,945
Arkansas	177,846	18,623	124,724	20,423
California	646,220	461,266	540,476	366,727
Colorado	99,511	66,933	73,107	45,274
Connecticut	166,357	91,086	166,381	80,902
Delaware	51,926	34,906	42,710	38,443
District of Columbia	141,277	88,395	126,637	87,905
Florida	95,649	36,600	106,826	37,770
Georgia	183,317	100,778	144,400	98,189
Hawaii	22,996	23,787	23,770	16,045
Idaho	25,547	10,241	22,930	8,961
Illinois	1,069,134	815,496	1,054,935	923,612
Indiana	616,508	410,735	682,234	482,652
Iowa	779,351	257,084	681,197	350,388
Kansas	300,175	159,469	198,757	88,175
Kentucky	215,082	87,771	202,923	117,036
Louisiana	422,388	129,428	505,614	97,884
Maine	90,276	84,934	86,427	80,949
Maryland	230,317	148,637	186,573	175.526
Massachusetts	318,456	253,183	377,774	272,853
Michigan	842,129	488,650	908,045	400,128
Minnesota	625,439	588,156	681,655	597,902
Mississippi	82,243	21,757	66,519	15,598
Missouri	500,949	456,782	439,866	478,055
Montana	35,590	14,670	32,722	15,319
Nebraska	272,654	86,063	281,405	48,233
Nevada	11,041	74,982	9,774	99,152
New Hampshire	43,410	21,685	63,680	17,092
New Jersey	508,242	310,576	519,732	282,170
New Mexico	29,840	16,937	21,853	11,869
New York	2,498,158	1,287,121	2,415,239	1,246,668
North Carolina	163,922	30,921	126,608	28,314
North Dakota	55,251	24,936	31,587	22,693
Ohio	817,720	525,399	869,396	539,371
Oklahoma	290,304	105,703	226,890	65,442
Oregon	109,997	40,056	102,903	56,746
Pennsylvania	866,697	461,699	807,513	451,127
Porto Rico	17,385	4,350	5,595	2,337
Rhode Island	66,438	36,789	57,157	33,395
South Carolina	224,825	50,320	151,919	24,879
South Dakota	110,088	28,654	101,420	27,280
Tennessee	162,661	88,321	110,542	90,884
Texas	586,255	333,082	588,163	331,951
Utah	43,516	9,655	42,650	10,745
Vermont	42,905	38,453	48,958	55,515
Virginia	193,085	82,323	178,952	72,801
Washington	226,264	167,838	265,116	119,136
West Virginia	184,176	101,063	179,975	89,286
Wisconsin	569,655	394,935	611,166	483,432
Wyoming	19,781	10,467	20,863	7,177
Unspecified	1,246	11,394	61,210	41,079
	16,034,778	9,242,279	15,512,920	9,198,814
Foreign countries	42,222	21,721	32,080	16,186
Total shipped from cement plants	16,077,000	9,264,000	15,545,000	9,215,000

RATIO OF PRODUCTION TO CAPACITY

	August		July	June	May
	1931 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)
The month	62.0	34.2	33.4	35.7	30.2
The 12 months ended	52.9	32.1	34.2	36.5	38.9

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Stocks End of Month		Month	Production		Stocks End of Month	
	1931	1932	1931	1932		1931	1932	1931	1932
January	8,129	6,107	10,384	8,184	July	12,246	6,613	10,209	7,889
February	7,473	5,176	11,946	9,375	August	11,664	7,078	8,468	7,202
March	9,586	5,443	13,318	10,025	September	10,414	.....	6,918	.....
April	11,540	5,924	13,854	10,511	October	9,825	.....	6,021	.....
May	13,159	6,273	13,087	9,922	November	8,259	.....	6,215	.....
June	12,679	6,803	11,837	8,877	December	6,840	.....	7,035	.....

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Shipments		Stocks at End of Month	
	1931	1932	1931	1932	1931	1932
January	6,595	5,026	4,692	3,393	27,759	25,778
February	5,920	3,971	5,074	3,118	28,612	26,657
March	8,245	4,847	7,192	3,973	29,676	27,545
April	11,245	5,478	11,184	6,536	29,715	26,496
May	14,010	6,913	14,200	8,020	29,554	25,394
June	14,118	7,921	16,077	9,264	27,602	24,035
July	13,899	7,659	15,545	9,215	25,934	22,512
August	13,549	7,835	15,172	10,968	24,313	19,379
September	12,092	.....	13,671	.....	22,736	.....
October	10,762	.....	12,360	.....	21,218	.....
November	8,161	.....	7,156	.....	22,219	.....
December	5,974	.....	4,142	.....	24,098	.....
Totals	124,570	.....	126,465	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, IN AUGUST, 1931 and 1932 (*thousands of barrels*)

District	Production		Stocks at end of Month	
	1931	1932	1931	1932
Eastern Pa., N. J., and Md.	2,514	1,346	1,237	976
New York and Maine	1,019	725	600	455
Ohio, Western Pa., and W. Va.	1,123	503	1,100	677
Michigan	587	315	823	1,012
Wis., Ill., Ind., and Ky.	1,479	949	871	489
Va., Tenn., Ala., Ga., Fla., and La.	1,218	381	715	436
Eastern Mo., Ia., Minn., and S. Dak.	1,302	938	587	478
W. Mo., Neb., Kan., Okla., and Ark.	817	552	461	499
Texas	633	303	310	238
Colo., Mont., Utah, Wyo., and Idaho	181	281	258	294
California	503	550	1,252	1,349
Oreg. and Wash.	288	235	254	299
Totals	11,664	7,078	8,468	7,202

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN AUGUST 1931 AND 1932, AND STOCKS IN JULY, 1932 (*thousands of barrels*)

District	August						Stocks at End of July 1932
	Production		Shipments		Stocks at End of Month		
	1931	1932	1931	1932	1931	1932	
Eastern Pa., N. J., and Md.	2,891	1,508	3,147	2,093	5,769	3,979	4,564
New York and Maine	1,375	879	1,556	932	1,489	1,594	1,647
Ohio, Western Pa., and W. Va.	1,296	650	1,353	1,062	3,505	2,293	2,705
Michigan	832	378	1,065	786	1,975	1,599	2,007
Wis., Ill., Ind., and Ky.	1,818	1,211	2,316	2,018	3,020	1,942	2,750
Va., Tenn., Ala., Ga., Fla., and La.	1,193	379	1,082	604	1,687	1,434	1,659
Eastern Mo., Ia., Minn., and S. Dak.	1,449	985	1,737	1,530	2,474	2,377	2,922
W. Mo., Neb., Kan., Okla., and Ark.	987	645	1,121	661	1,490	1,531	1,547
Texas	644	325	667	386	603	605	667
Colo., Mont., Utah, Wyo., and Idaho	209	206	232	141	585	482	417
California	552	513	595	549	1,114	1,014	1,049
Oreg. and Wash.	303	156	301	206	602	529	578
Totals	13,549	7,835	15,172	10,968	24,313	19,379	22,512

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1931 AND 1932

Month	Exports				Imports			
	1931		1932		1931		1932	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	41,199	$115,678	36,704	$82,984	95,609	$120,298	14,375	$16,648
February	25,703	88,989	12,889	39,350	21,984	25,391	83,706	69,197
March	54,599	144,579	39,105	81,856	70,378	80,360	19,173	17,215
April	40,478	116,564	30,123	69,451	53,333	58,576	59,392	41,487
May	48,028	140,953	31,634	71,048	19,325	20,568	9,223	7,358
June	43,597	107,610	33,134	72 084	32,079	42,955	20,963	15,496
July	29,344	97,837	18,872	54,814	14,332	15,582	31,518	24,904
August	39.517	106.643	.....	.....	8,895	11.739	.....	.....
September	27,570	81.399	.....	.....	33.574	33.520	.....	.....
October	24.531	68.524	.....	.....	39,642	42,380	.....	.....
November	33,200	97,796	.....	.....	27,940	22,235	.....	.....
December	21,887	54,028	.....	.....	40,147	34,314	.....	.....
Totals	429.653	1,220,600	.....	.....	457,238	507,918	.....	.....

Public Works Authorized Under Relief Bill Plans

The entire government public-works program, entailing an expenditure of $186,214,000, has now been authorized under the provisions of the Relief Bill and work is to proceed immediately, according to reports from Washington, D. C. Public buildings and river-and-harbor projects compose the bulk of the program.

Public works were secondary relief measures in the bill, but the delay in authorizing self-liquidating projects caused Pres. Hoover and government officials to allow immediate action on such works in order to provide employment as quickly as possible.

Confident Relief Bill Will Bring Trade Gain

Presidential approval of the compromise emergency relief and construction legislation has given to the country its first real opportunity thus far to work itself out of the present depression and should lead to an early and definite swing toward national trade recovery Henry J. Kaiser of Oakland, Calif., president of the Kaiser Paving Co., an important aggregate producer in the San Francisco area, declared in a statement recently.

"While the volume of federal construction provided in the bill is disappointing to many who believed that the government must take the lead in providing specific projects to absorb the unemployed so as to recreate purchasing power and revive general business activity, I believe that the approved loan provisions of the relief bill will immediately bring out a surprisingly large volume of long delayed but worthy projects, the launching of which is bound to have a marked stimulus on all lines of trade," Mr. Kaiser said.

Incorporations

BUCKEYE SAND & GRAVEL CO., Bellaire, O. Capital $25,000. Ross Neal, David Dankworth, David Danenburg, Isabelle Gibbens and others, all of Belmont, O.

LAKE ERIE SAND & TRANSPORT CO., Port Clinton, O. Capital $25,000. Walter Kelbe, Edward Masten, John Heinsen, Norton C. Rosenstreter, Oak Harbor, O.

MONARCH SAND & GRAVEL CO., Parma, N. Y. 250 shares common. H. E. MacArthur, Brockport, N. Y.

PORT DEPOSIT GRANITE CORP., Elkton, Md. Thomas P. Murray, Towsen, Md.; J. Wesley McAllister, Elkton.

MARYLAND MICA MINING CO., Marriotsville, Md. William H. Green, president.

Personal Mention

Tests Indicate Effect of Heating on Strength

In an investigation conducted by the State Material Testing Bureau, Dahlem, to determine the effect of heat on the strength properties of natural stones, a number of igneous and sedimentary rocks (basalts, diabases, porphyries, granites, a quartzite, a sandstone, a trapstone, two limestones and an argillite) were tested both in the form of sawed cubes and in the form of coarse and fine crushed rock; the specimens were heated to varying degrees to 900 deg. C., tested for strength properties and compared with unheated specimens of the same respective rocks. The data presented yield the general conclusion that stones acceptable in their strength properties before heating are resistant to the action of heat up to 500 deg. C., the strength being decreased practically none if the stone is slowly cooled in air. It was found that fine crushed stone suffers less at the higher temperatures than coarse crushed stone, and this less than the sawed stone cubes. These rather astonishing results were explained by the effect of crushing in separating the stone at hair-cracks or weak joints, which remain present in the larger stone and especially in the sawed cubes.

When heated beyond 500 deg. C. all stones except one of the limestones showed a considerable drop in strength, especially if quenched after the heating. Granite heated above 500 deg. was so greatly weakened (as the investigations of Endell, Mautner and Grün-Beckmann would make one expect) that it was partly disintegrated.—Dr.-Ing. Kurt Stöcke in *Steinindustrie* 27:115-118, July 21, 1932.

Modern Feldspar Plant Is Erected in Rumania

Feldspar is accompanied in most natural deposits by so many other minerals difficult to separate from it that there are in all Europe scarcely more than a dozen plants engaged in its preparation. A mill recently built at Teregova, Rumania, is interesting for its modern equipment and methods. The raw mineral from the pit is received in a large bin, and from there is fed to a picking belt 7 m. long moving at 12 m. per min., from which three pickers remove associated minerals and impure feldspar, also taking out the large pieces of pure feldspar of pure quartz which are too valuable to be crushed. Then the rock is broken to 140-mm. size in a jaw crusher, and passed over a shaking screen where dust and pieces below 7 mm. in size are removed. The remainder passes to a washing trommel 4.7 m. long and 0.85 m. in diameter, where it is divided into fines 7 to 50 mm. and coarse 50 to 140 mm. These go separately to a second picking belt, where 30 women—for this work can not be done mechanically—make a final separation according to color and quality.

Feldspar is dried, in the summer in the air, otherwise in a kiln which serves also for calcining quartz, and is ground in a plant carefully planned for this difficult service. The stone, up to 144 mm. in size, passes first through a fine-set jaw crusher, and the product is lifted by a bucket-elevator to a hexagonal screen provided with round openings of 11 and 3 mm. The product under 3 mm. goes to the tube-mill feed-bin; that from 3 to 11 mm. to a fine-set roll crusher; and that over 11 (up to 25) mm. to a coarse-set roll crusher; products of the rolls return to the hexagonal screen to close the circuit. Material below 3 mm. goes to a tube-mill, 8 m. long and of 1.025-m. interior diameter, lined with silex. The grinding elements are flints of 60-mm. to 120-mm. diameter; the mill carries a charge of 4.3 tons of these, and the daily consumption is 82 kg. A bucket-elevator carries the product to an air-separator that handles 2,000 kg. hourly. The residue returns to the tube-mill. Both before entering the tube-mill and after passing the separator the fine feldspar moves over magnetic separators for the removal of iron particles. Mica is removed by means of slots in the chutes which feed the roll crushers and where it accumulates because it slides more slowly than the feldspar.

The same installations serves from time to time for grinding quartz. This is calcined, that is, converted at 870 deg. C. to ∝ (alpha) -tridymite, in a special kiln, then quenched with water; in the resulting state it is considerably easier to grind in the tube-mill, the lining and charge of which are, as noted, made of silica in other physical forms.—*Steinindustrie* 27: 112-113, July 21, 1932, from *Berg- und Hüttenmännischen Jahrbuch der montanistischen Hochschule in Leoben* 1931, vol. 19, p. 109.

Study Improvements to Clinker Lining Bricks

Like all materials used as refractory linings in cement kilns, bricks made of cement clinker and cement binder have a life varying greatly with varying conditions of kiln operation. The investigators sent a questionnaire to all cement plants of the U. S. S. R., in an attempt to study the relation of the method of production of the clinker bricks and the conditions of kiln operation to the life of the lining, but the data varied so widely that no clear conclusions could be drawn.

When the cement binder of such bricks is heated, the water of combination is driven off (as shown by the work of Prof. K. Endell) and the hydration products are converted into quite other compounds, so that such bricks begin to change in structure as soon as they are installed in the kiln. Observation of clinker lining-bricks from two kilns showed that the surfaces were protected by a crust, which when cool disintegrated rapidly, and that throughout the lining a series of alterations of structure had taken place, shown by changes of color and of strength properties. To study the effect of a specific temperature, several clinker bricks (300 mm. by 120 mm. by 65 mm.) were set in the door of a ceramic laboratory kiln, operating at a temperature of 1,500 deg., in such a way that a layer of 50 to 60 mm. was directly exposed to the high temperature while the remainder was left outside. After several days the portion directly exposed to the heat had become a black sintered mass, and the remainder showed a series of zones similar in structure and strength to those of bricks from cement kilns. It is evident that clinker brick is not in itself a refractory material; it owes its merits in the cement kiln to the formation of the protective crust. This explains the damage done by stopping the kiln, for when the kiln cools, this crust crumbles and on re-firing the material next exposed again forms a crust. The oftener the kiln is stopped, the shorter the life of the lining.

To make the clinker brick a true refractory it must be converted, before installation in the kiln, into a uniform material not subject to alterations of composition and structure in the kiln. This means converting the cement binder into clinker, and preliminary investigations have shown that a temperature of 1,450 deg. is necessary, that is, the customary temperature of the kiln. Tests were made with bricks made of varying proportions of cement and clinker (cement varying from 25 to 100 per cent.); the best was a mix of 45 g. of cement to 55 g. of clinker. Because of the difficulty of maintaining a constant temperature of 1,450 deg., attempts were made to lower the temperature required by means of admixtures of varying proportions of crystalline calcium chloride, chemically pure iron oxide and natural fluorspar. All

such specimens were held at 1,300 deg. for 4 to 5 hr., then 2 hr. at temperatures varying from 1,350 to 1,450 deg.; then gradually cooled. All admixtures facilitated the sintering. The highest feasible admixtures are 3 per cent. of fluorspar, 1 per cent. of calcium chloride or 1 per cent. of iron oxide. Admixtures of over 5 per cent. cause secondary reactions. Specimen bricks made with and without admixtures were exposed to the one-side heating in the ceramic kiln. All bricks after one heating and cooling showed cracks between the portions inside and outside the kiln door. The change of volume probably responsible for this is due probably to the conversion of the β 2 $CaO.SiO_2$ to the δ-form. To lessen this action, tests were run on specimens with admixtures of H_3BO_4, Cr_2O_3, and $FeO.Cr_2O_3$. The best effect was from a combination of 1 per cent. of $CaCl_2$ and 2 to 3 per cent. of Cr_2O_3. Such a brick remained almost unaltered after 10 heatings and coolings. Some admixtures increased the resistance to repeated heating and cooling but did not do away with the tendency to cracking. The addition of Cr_2O_3 in the form of $K_2Cr_2O_7$ is best of all. but this material unfortunately is very expensive.

As the formation of large quantities of β 2 CaO.SiO is attributed to unequal distribution of $Ca(OH)_2$ in the mass, a further test studied the addition of CaO, water-glass and bauxite, respectively. The addition of 1 to 2 per cent. of CaO acts practically as the addition of Cr_2O_3, increasing the resistance to repeated heating and cooling about 9 times. Water-glass has less effect. Specimens with an admixture of bauxite (1 to 8 per cent.) shrank in volume.

These tests unfortunately do not cover other important requirements of refractory linings: resistance to wear at high temperatures, and conductivity at 1,500 deg. Further tests are to be made on such linings installed in a commercial kiln.—Prof. Dipl.-Ing. W. N. Jung (Communication of the Cement Laboratory of the State Building Materials Institute, Moscow) in *Zement* 21:433-438, July 28, 1932.

Adapt Vertical Kiln to Calcination of Gypsum

The Dalen-Feron shaft kiln for burning gypsum is not a new apparatus but a modification of the lime-burning type of shaft kiln made to meet the requirements of gypsum. It is continuous in operation, avoiding the heat losses of the chamber-type gypsum kiln, and as the temperature can be held constantly at a uniform point, it produces a stucco of slower set than those produced by either chamber or rotary kilns. Another great advantage is that the gypsum is ground after rather than before burning, thus saving in power expenses. The rock can be fed to the kiln in pieces of 10 to 12 cm. (4 to 5 in.). (The kiln is illustrated by drawings, but is not further described).—P. Feron and H. Dallemagne in *Cemento* (Barcelona) 4:286-287, Aug., 1932.

Small Homes in Germany Open Materials Market

In spite of the general dullness of economic conditions, or in part because of it, there has been taking place in Germany a considerable activity in the construction of small homes. Three general movements are recognized in this trend: (1) a state program of settling sparsely populated areas with families who are leaving the great cities, (2) a program of suburban development around the cities, and (3) the release of funds from private savings to acquire a plot of ground and a home at present attractive prices. The journal *Tonindustrie-Zeitung*, Berlin, devotes most of its Aug. 25 issue to a study of this market for construction materials, and presents articles discussing the proper applications of the important nonmetallic-mineral products in small dwellings. Even cement, usually thought of as a material for heavy construction, has important uses in such a program, and the industry, realizing that "many a mickle makes a muckle," is going after this business.

Slag-Mortar Specimens Tested After 23 Years

Although blast - furnace cement from slag and cement clinker has been made in Italy since 1906, slag cement as such has never been produced in that country. An attempt to produce cement from slag without clinker was made in 1908, and although it was not successful it was the starting point of some important investigations of the properties of granulated basic slag. In that year, 1908, a number of specimens of 1:3 mortars, using one cement consisting of 97 per cent. slag, 1.5 per cent. slaked lime and 1.5 per cent. gypsum, another with 1 per cent. lime and 2 per cent. gypsum, and a third being a mixture of the first two, was prepared and then tested at periods up to two years. A group that was to be tested at five years was not, for various reasons, broken, and these were only tested in Aug., 1931, after 275 mo.

In the case of each of the three cements specimens had been prepared with the use of Italian standard sand, German standard sand (Freienwald) and, in one case, a Sicilian river sand as well. The average results at 275 mo. varied from 65.90 to 85.22 kg. per sq. cm. in tensile strength and from 562 to 980 kg. per sq. cm. in compression. One mortar, compared directly with results at earlier periods, showed compressive strengths of 110 kg. per sq. cm. at 3 days, 161 at 7 days, 229 at 28 days, 307 at 84 days, 410 at 12 mo., 440 at 24 mo., and 960 at 275 mo.; the progression in tensile strength (the mortar represented is not identically the same) is from 15 kg. at 3 days, 21.1 kg. at 7 days, 32.1 at 28 days, 35.3 at 84 days, 38.2 at 12 mo., and 41 at 24 mo., to 78.7 at 275 mo.

Moduli of elasticity determined by what tests it was possible to make with the limited test specimens ranged from 184,000 kg. per sq. cm. at 346 kg. per sq. cm. tension to 1,080,000 at 23.5. The results of the tests are not sufficient for any generalizations, but do show the merits of slag as raw material for an excellent hydraulic binder.—Dr.-Ing. Aldo Bruschi in *Zement* 21:449-451, Aug. 4, 1932.

Quality of Lime Varies with Structure of Stone

In spite of previously published studies of the relation of the physical structure of limestone to the quality of lime produced from it, the tendency to ascribe the quality of lime only to the chemical composition and the temperature of burning is still more prevalent than it should be. In the investigation reported here comparative observations were made on samples of three limestones of almost identical chemical composition. The stone designated P was a yellowish gray-white fine-grained limestone of somewhat brittle and porous character. Limestone K was fine-crystalline and solid; limestone D was exceptionally fine-grained, dense and solid. Boiling in water showed P to have an absorption of 4 per cent., K of 2 per cent., and D none.

In the systematic investigation of these stones samples of each were burned at temperatures of 900, 1,000, 1,100, 1,200, 1,300 and 1,400 deg. C., and under identical conditions in the same kiln. All the resulting limes were of white color, but differed in physical character: lime from P being plainly "rotten" and powdery, the other two firm, but D inclined to cracking in the fire. Soaking in petroleum revealed absorption percentages as follows:

Calcining Temp.	900°	1,000°	1,100°	1,200°	1,300°	1,400°
P	8	39	46	46	46	45
K	3	19	35	32	27	23
D	8	24	29	27	18	17

Strength tests showed a superiority for lime D, K being second. Lime D also resisted the effects of storage best. The yield in milk of lime for 5 kg. of quicklime was 12.8 liters for P, 16.3 liters for K, and 15.1 liters for D. The variety K is considered the best commercially; it yields a strong lime resistant to the effects of storage, and can be burned without fear of cracking.—Dr. Max Pulfrich in *Tonindustrie-Zeitung* 56:608-609, June 13, 1932.

Recent Patents

AMERICAN

Cement and Concrete

Process of bonding cement and gypsum. Cloyd M. Chapman, Douglaston, N. Y. No. 1,874,170.

Process of making Portland cement from coal arches. William E. Guertler, Berlin, Germany, assignor to Electric Smelting & Aluminum Co., Cleveland, O. No. 1,874,186.

Method of making magnesian cement. Royal W. Gelder, Greeley, Colo. No. 1,876,909.

Water-tank for concrete mixers. Gebhard Jaeger and Joseph Eggert, Columbus, O., assignors to Jaeger Machine Co., same place. No. 1,876,946.

Heater for mixers for concrete and the like. Percy F. Stary, Detroit Lakes, Minn. No. 1,875,516.

Concrete agitator. George L. Lockwood, Portland, Ore. No. 1,875,622.

Crushing and Grinding

Rock crusher. Howard J. McElvain, Portland, Ore. No. 1,874,329.

Jaw crusher. Edgar B. Symons, Hollywood, Cal., assignor to Nordberg Mfg. Co., Milwaukee, Wis. No. 1,874,830.

Grinding mill. Harlowe Hardinge, York, Pa., assignor to Hardinge Co., same place. No. 1,874,985.

Apparatus for pulverizing materials. William J. A. London, Hartford, Conn., assignor to Peabody Engineering Corp., New York, N. Y. No. 1,875,817.

Portable crushing, screening, and loading plant. Hank Knipple, Bozeman, Mont. No. 1,876,460.

Drilling

Rock drill. Raymond H. Smickle, Belvidere, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,874,130.

Valve mechanism for rock drills. William A. Smith, Jr., Phillipsburg, N. J., assignor to Ingersoll-Rand Co. No. 1,874,133.

Excavating and Loading

Digger tooth. Van C. Mekeel, Wauwatosa, Wis. No. 1,874,783.

Excavating machine. Henry H. Talboys, Milwaukee, Wis., assignor to Nordberg Mfg. Co. No. 1,874,831.

Excavating machinery. Rolf Ljungkull, St. Paul, Minn., assignor to Harnischfeger Corp., Milwaukee, Wis. No. 1,875,052.

Loading machine. Frederick W. Vodoz, Wilmette, Ill., assignor to Goodman Mfg. Co., Chicago, Ill. No. 1,875,783.

Excavating machine. Elmer L. Ennis, Gary, Ind. No. 1,876,283.

Materials Handling

Gate for material-conveying chutes. Robert W. Kaltenbach, Cleveland Heights, O. No. 1,876,685.

Car-dumper chute-control mechanism. Robert W. Kaltenbach. No. 1,876,686.

Hoisting bucket. Jacon L. Good and Walter E. Click, Elkhart, Ind., assignors to Godfrey Conveyor Co., same place. No. 1,876,288.

Screening and Separating

Means for classifying materials in jet-impact pulverizers. Paul Anger, Kiel, Germany. No. 1,874,150.

Air separator. William A. Gibson, Allentown, Pa., assignor to Bradley Pulverizer Co., same place. No. 1,876,911.

Grizzly bar. Loren G. Symons, Hollywood. Cal., assignor to Symons Bros. Development Co., same place. No. 1,876,034.

FOREIGN

Cement

Cement. Cement Marketing Co., Ltd.. H. Keeble and H. N. Wrigley. British 377,956.

Method of producing a hydraulic binding medium in powdered form. H. Plauson and M. Imer. British 378,107.

Apparatus for the treatment of raw cement slurry. F. Krupp Grusonwerk Akt.-Ges. British 378,555.

Manufacture of high-early-strength hydraulic cement. Robert E. Windecker. Painesville, Ohio. Canadian 325,271.

Concrete and Concrete Products

Mortar or concrete article manufacture. Eugene Freyssinet, Neuilly-sur-Seine, and Jean Seailles, Paris, France. Canadian 325,205.

Methods of and apparatus for the production of concrete slabs or blocks, and the product thereof. D. Whitaker. British 378,558.

Presses for producing tubes, especially of cement. Graber & Wenig. British 378,816.

Treatment of concrete. Colas Roads, Inc., Boston, Mass., assignee of Clarence V. Kiefer, San Pedro, Calif. Canadian 325,519.

Reinforced-concrete parts. Societe Lap, Paris, and Societe des Applications Mecaniques du Ciment Arme, Ablon, Seine-et-Oise, France. German 557,224.

Drilling

Variable-stroke percussive drilling and the like machines or devices. T. R. Scott and A. Wheatley. British 377,676.

Rock and like drilling operations. Pyrene Co., Ltd. British 378,318.

Drying

Cooling and drying of granular and like materials. G. Portens. British 378,313.

Heating of drying chambers. H. Berge. British 378,339.

Method of and apparatus for drying materials. A. E. Sherman, E. R. Jones, and P. C. Lavender. British 378,384.

Excavating and Dredging

Suction dredgers. Deutsche Schiff- und Maschinenbau Akt.-Ges. British 378,761.

Process and apparatus for the selective excavation of mineral deposits in open pits. ATG Allgemeine Transportanlagen Gesellschaft m. b. H., Leipzig, Germany. Canadian 325,285.

Gypsum

Wall-board package. Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Ont., assignee of Curry O. Walper, Kitchener, Ont. Canadian 325,538.

Production of gypsum and like slabs provided with fiber fillers. C. Backmeier, Stuttgart. German 557,223.

Kilns

Apparatus for carrying out roasting, sintering, calcining and the like operations. Metallges. Akt.-Ges. British 378,334.

Rotary kiln and cooler. F. L. Smidth & Co., New York, N. Y., assignee of Louis S. Petersen, Elizabeth, N. J. Canadian 325,371.

Lime and Magnesia

Process for the manufacture of artificial stones from lime. K. Höller and S. Schless. British 376,150.

Treatment of magnesite for the production of fertilizers. C. A. A. Vilain and A. A. J. Vilain, trading as Soc. Vilain Freres. British 377,720.

Material-Handling

Device for transferring bulk materials from a railway car to a conveyor belt. J. Pohlig Akt.-Ges. British 378,109.

Conveyor chains. R. T. Shelley, Ltd., E. G. Lawrence, A. B. Britton and J. H. Darrah. British 378,247.

Jig-conveyor motors. Flottmann Akt.-Ges. British 378,297.

Apparatus for conveying plastic material. A. H. Stevens (Phosphate Acidulating Corp.). British 378,364.

Conveyor systems, and switching mechanisms therefor. W. W. Triggs (J. B. Webb). British 378,719.

Jigger conveyors. A. Eickhoff, trading as Geb. Eickhoff Maschinenfabrik und Eisengiesserei. British 378,783.

PIT AND QUARRY will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.

Mining and Quarrying

Adjustable pit-prop. G. Macbeth. British 378,175.

Loading or conveying systems for use in mines. G. Walton-Brown. British 378,512.

Steel pit-prop. D. Baird, D. C. Gemmell and Wemyss Coal Co., Ltd. British 378,736.

Mixing

Mixer and agitator. United Castings, Ltd., T. Duckworth and P. S. Deeth. British 378,557.

Mixing and stirring machines. A. Henkel. British 378,841.

Transit concrete mixer. Roscoe F. Lee, Indianapolis, Ind. Canadian 325,453.

New Trade-Marks

TRADE-MARKS recently passed for publication by the United States Patent Office and in line for registration unless opposition is filed are described briefly and illustrated below. This feature will appear occasionally in future issues of PIT AND QUARRY *through arrangements with the National Trade-Mark Co., Washington Loan & Trust Bldg., Washington, D. C. This concern will make an advance search free of charge on any trade-mark which producers may contemplate adopting or registering. Send inquiries direct to the company.*

324,197—*Superconcrete*—Hydraulic cement-concrete paving material. Super Concrete Emulsions, Ltd., Los Angeles, Cal. Claims use since Nov. 16, 1931.

326,271—*Straublox*—For concrete building blocks. Francis J. Straub, New Kensington, Pa. Claims use since March 24, 1932.

326,530—*Cemelith*—For cementitious surface coating for floors, walls and other structures. Super Concrete Emulsions, Ltd., Los Angeles Cal. Claims use since Feb. 10, 1931.

327,040—*Phoenix* — For construction materials composed of slate, namely, roofing, building partitions and sidewalks. Brunswick-Balke-Collender Co., doing business as the Phoenix Slate Co., Wilmington, Del., and Chicago, Ill. Claims use since Jan. 1, 1910.

327,041 — *Phoenix* — For quarried slate. Brunswick-Balke-Collender Co., doing business as the Phoenix Slate Co. Claims use since Jan. 1, 1910.

327,186—*Jedco*—For cement and plaster mixtures. Jedco Products Co., Brooklyn, N. Y. Claims use since April 28, 1932.

328,155—*Saturmix*—For aggregate such as crushed stone, slag, or other aggregate coated with tar asphalt or other binder, to be used for road-building purposes. The Blacktop Equipment Corp., Johnstown, Pa. Claims use since Feb. 29, 1932.

328,650—*Texas Limestone*—For quarried natural stone. Texas Quarries, Inc., Austin, Tex. Claims use since Jan., 1930.

328,866—*24 Hour Concrete*—For Portland cement (the words "24 hour concrete" are disclaimed apart from the other features of the mark shown in the drawing). Dewey Portland Cement Co., Kansas City, Mo. Claims use since June 30, 1932.

329,031—*Grimms*—For lime. The Western Lime & Cement Co., Milwaukee, Wis. Claims use since Dec. 23, 1930.

329,032—*Mortarite*—For masonry cement. Western Lime & Cement Co., Milwaukee, Wis. Claims use since Jan. 24, 1929.

Concrete-Mixing

Concrete-mixing device. J. B. Amann, Munich. German 557,171.

Unloading apparatus for cargo vessels. Harry W. Peterson, Montreal, Que. Canadian 324,696.

Method of and apparatus for mixing and spraying or moistening pulverulent, granular, or other more or less finely divided material. C. E. Gardner. British 377,199.

Apparatus for mixing granular or powdery materials. W. F. Keevil and O. F. Keevil. British 377,626.

Mixing impeller. Turbo-Mixer Corp., assignee of James Peters, New York, N. Y. Canadian 324,839.

Sacking

Multi-ply bags, and method of producing them. B. Arkell. British 376,967.

Process and means for producing paper bags. Ateliers de Constructions Mecaniques C. & A. Holweg and C. Freysz. British 378,777.

Screening and Separating

Separation of dry materials. Ivor L. Bramwell and Birtley Iron Co., Birtley, England. Canadian 324,624.

Wire screen. K. H. Hoesch, Düren. German 555,901.

Electrical gas-purifying installation. Metallgesellschaft Akt.-Ges., Frankfurt a. M. German 556,706.

Suction-vane filter. G. Polysius Akt.-Ges., Dessau. German 556,619.

Classification apparatus. W. W. Triggs (Dorr Co.). British 377,220.

Method of and apparatus for separating solids from liquids. M. K. E. Bailey (executrix) and F. H. Jackson. British 377,353.

Unclassified

Production of basic carbonates of magnesia, particularly for heat-insulation. Lüneburger Isoliermittel- und chemische Fabrik, Lüneburg. German 556,514.

Silica bricks. H. Salmang and B. Wentz, Aachen. German 555,767.

Device producing porous dry slag. Ludwig von Reiche and Julius Giersbach, Oberscheld, Germany. Canadian 324,871.

Refractory material comprising magnesite, a binder and a small proportion of chromium ore. Koppers Co., Pittsburgh, Pa., assignee of Heinrich Koppers Akt.-Ges., Essen, Germany. Canadian 325,168.

Plasters and the like. G. O. Case, E. M. Ellis and L. H. Montigue. British 378,209.

Recomposing raw phosphates. M. C. Wade and W. S. Sharpe. British 378,670.

Refractories. A. Sprenger, Berlin-Karlshorst. German 557,153.

Refractory masonry. P. Giese, Cologne, and Sieg-Rheinische Bank, Cologne. German 556,891.

Stone replacing natural ornamental stones. O. Ruff and F. Ebert, Breslau. German 556,926.

Manufacturers' Publications

Copies of any of these publications may be had by writing the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Blasting

Cordeau-Bickford Detonating Fuse. 40 p. (Ensign-Bickford Co., Simsbury, Conn.) A new catalogue featuring Cordeau fuse which is, in fact, a textbook on the new technique in blasting, which uses one detonator placed at some distance from the actual charge, the detonating wave conveyed to and through the charge by means of the detonating fuse. Contains a general description of the fuse, instructions for connecting and loading holes, a chapter on tunnel blasting and several pages devoted to testing the speed of explosives.

Engines, Gasoline

Waukesha Full-Power Engines. Folder. (Waukesha Motor Co., Waukesha, Wis.) Describes and illustrates the new Waukesha "Full-Power" engines, so-called because they are said to eliminate "paper" horsepower and set a new conservative rating standard. Contains details of vital parts and specifications.

Gauges

Huggenberger Tensometers. 12 p. (Bull. No. 37. Baldwin-Southwark Corp., Philadelphia, Pa.) Describes and illustrates a line of lever-type strain gauges. A short technical discussion of the fundamental principles of these instruments is followed by detail data and suggestions concerning application of the various types. Fixing devices which are necessary in the application are described and illustrated. A section describes the methods of mounting and using Tensometers.

Motors, Electric

G-E Small A-C Hoist Motors. Leaflet. (Bull. 1366. General Electric Co., Schenectady, N. Y.) Describes and illustrates Type KR hoist motors for alternating current of high starting torque and high slip. Built in sizes from 1½ to 15 hp., 2 and 3 phase, standard speeds and supplied for voltages of 220, 440 or 550.

Scales

Kron Scales—Springless, Accurate. 8 p. (The Kron Co., Bridgeport, Conn.) A new bulletin describing and illustrating a completely redesigned line of automatic industrial scales. Dial-and-lever mechanism has been considerably simplified.

Screens

Jigger Vibrating Screens. 20 p. (Bull. No. 732. Productive Equipment Corp., Chicago, Ill.) Points out the essential features of a new type of vibrating screen. The machine incorporates an automatic cleaner and fluffer, the decks of the screen being enclosed if confined screening is desirable. Vibration is accomplished by an eccentric shaft turning in an eccentric tube.

Welders

The New Lincoln Shielded-Arc Welder. 8 p. (The Lincoln Electric Co., Cleveland, O.) Describes and illustrates a portable welding outfit especially designed to operate the shielded-arc electrodes. Features include uniform welding current, safety control cabinet, reversible voltage control for changing polarity, dual control of welding heat, and a laminated magnetic circuit.

Abel Davis and Franklin H. Fowler, receivers in equity for Foote Bros. Gear & Machine Co., announce that arrangements are being made with the approval of the federal court to move all manufacturing operations of the company now being carried on at the Curtis St. plant, to the Plamondon Division at 5301 S. Western Ave., Chicago. At the same time some surplus machinery will be disposed of.

Pumpings from the Old Pit

Fifteen Years Ago

A NEW freight yard was being built at Elkhart, Ind., by the St. Joseph Valley Railway to accommodate shipments of sand, gravel and marl. Depressed team tracks were to facilitate the unloading of material directly into trucks.

* * *

New companies entering the industry included Royal Sand & Gravel Co., Columbus, O.; Elkins Limestone Crushing Co., Elkins, Va.; West Jersey Sand & Supply Co., Camden, N. J.; Lincoln Crushed Stone Co., Joliet, Ill.; New Lexington Sand Co., New Lexington, O.

Ten Years Ago

MEMBERS of the National Lime Assn. held a special meeting at Chicago to formulate a campaign to increase lime sales.

* * *

Plans were being perfected by the National Portland Cement Co. of Mt. Pleasant, Mich., for the erection of a new cement mill at Coldwater, Mich.

* * *

Chester J. Pegg, who had been assistant superintendent at the Union Bridge, Md., plant of the Tidewater Portland Cement Co., was appointed general superintendent by the Limestone Products Co. of America at Newton, N. J.

Cement prices took another step upward in the east due to a car shortage and scarcity of labor in the Lehigh Valley district. New York retailers were delivering the commodity at a new high level of $3.45 per bbl.

* * *

H. G. Jacobsen, head of the accident-prevention of the Portland Cement Assn., addressed the National Safety Congress on the early progress of the association's campaign to reduce accidents in the cement industry.

Five Years Ago

PLANS were announced by the Marquette Cement Manufacturing Co., for the expansion of its plant at LaSalle, Ill., increasing its capacity to 1,000,000 bbl.

* * *

As a reward for working an entire year without a lost-time accident, 175 employees of the Oakfield, N. Y., plant of the United States Gypsum Co. were feted at a banquet in celebration of the achievement.

New Machinery and Supplies

New Line of Buckets for Light Drag-Line Service

The Page Engineering Co., pioneer in the development of the drag-line method of excavation, announces the addition of a new series of buckets to its large line. These buckets are being designated as Class LM and are especially designed for digging in light soils.

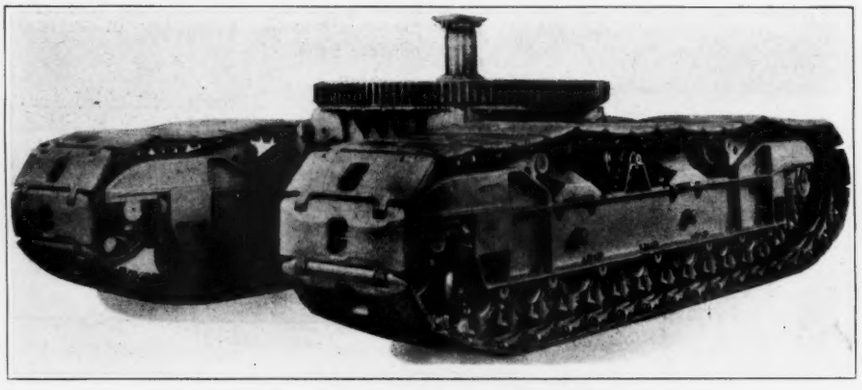
Lightweight, strength and simplicity are the chief characteristics of the buckets. They represent a combination of electric-arc welding, plus hot riveting. Their construction is unique—the side walls and back being formed of thinner steel plate than the bucket bottom—yet resembling one surface. The joints are "apron" welded and the seams are ground down smoothly. This perfect fusing makes for one-piece construction, and not only insures strength where strength is needed, but also gives smooth clean surfaces that shed dirt quickly and easily.

The hitch-plate construction, covered by patents, is such that any desired pitch may be obtained, since Page construction permits altering overhang or draft, without making it necessary to increase length of bucket jaw. It also limits wear at this point to two easily replaceable stock parts, namely, a clevis and pin, a valuable time-saving factor, which keeps the bucket on the job and not in the repair shop, due to attachments pulling through bucket jaw.

The dump block embodies a sheave which increases leverage on dumping cable, causing the cutting edge of bucket to lift first. The bucket can be lifted as soon as it is loaded eliminating a long drag, and saving wear on drag brake, drag cable and dump cable. The sheave maintains the carrying position of bucket throughout the swing to spoil bank.

Other features comprise the patented one-piece loading cluster socket, wear-resisting chains, bulbed missing links and fittings.

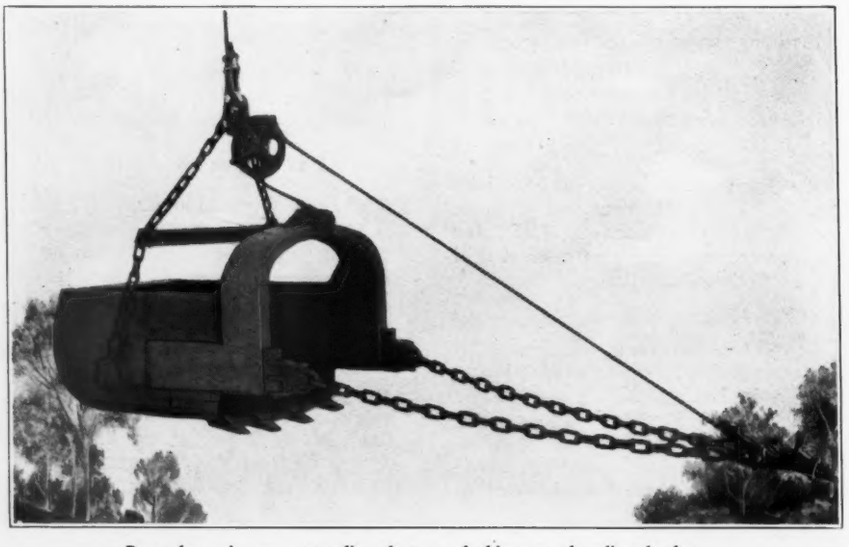
This new series of Page LM buckets is available in all the sizes most generally used for light excavating (1-, 1¼-, 1½-, 1¾-, and 2-cu. yd. capacities). Literature may be procured by addressing the manufacturer at Clearing Post-office, Chicago, Ill.



A view of the oversize crawler mounting.

New Oversize Crawlers for Drag-Line Mounting

A new oversize crawler mounting is announced by Bucyrus-Erie Co. of South Milwaukee, Wisconsin, for application to its 52-B drag-line. This new mounting has many features of considerable interest to drag-line users. It is extra long, providing greater stability when the drag-line stands and digs on soft bottom. The mounting is extra wide and can be furnished with 36 in. or 42 in. links to give greater bearing area than the standard mounting used for solid bottom. The other essential requirement of liberal clearance under the truck frame has been met, and mud guards protect the simple driving machinery. Large rollers and Bucyrus-Erie crawler links preserve the nonclogging feature. Easy steering is controlled from the operator's station on deck. The ends of the two crawler belts are tapered to facilitate going through soft places and walking over logs. The overall length is 21 ft. 2 in. and the overall width is 13 ft. 6 in. The bearing area is 122.5 sq. ft. The 52-B drag-line to which this mounting applies is listed as handling a 1½-cu. yd. heavy type Bucyrus-Erie drag bucket on a 75 ft. boom and other combinations can be worked out to suit the special requirements of the job.



Ruggedness is an outstanding feature of this new drag-line bucket.

Resinous Textile Used in Making New Bearing

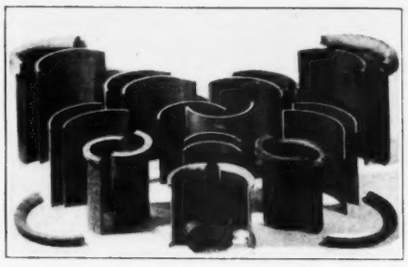
Joseph T. Ryerson & Son, Inc., have announced a new bearing made from synthetic resin similar to "bakelite" and with textile material as the base. The strong belting textile material reinforces the resinoid, which completely fills and saturates it. The composite material is then subjected to great heat and pressure. At approximately one ton pressure per square inch and 340 deg. F., the product sets.

The physical characteristics are entirely changed and the bearing is no longer fusible or soluble. It cannot be re-softened by heat, will not absorb water or oil and is resistant to most acids. It is, however, attacked by hot caustic alkalies.

In making the Ryertex bearing, as this new product is called, the pres-

sure and heat is applied through dies which form it into the exact size and type of bearing required while at the same time they set the material. Ryertex is extremely hard and will show a Brinell reading of about 30-40 and a sclerescope reading of 70-80. Actual service tests have shown that Ryertex bearings will outlast babbitt and bronze applications from four to ten times. They are particularly satisfactory in cases where it is easier to apply water as a lubricant than oil though they will operate satisfactorily with oil if this is desirable.

In the case of rolling mills of different kinds and other special applications, the greater hardness of the bearing permits the roller to hold his section better as the wear is much slower.



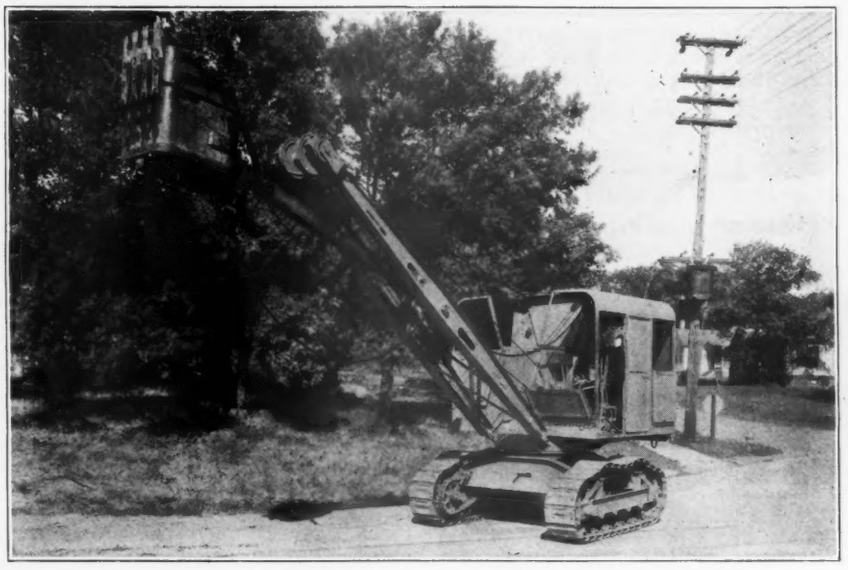
Bearings shaped from synthetic resin.

There usually is a definite saving in the initial cost of the bearing though this is a small fraction of the larger saving which is made through greater length of service and decreased power consumption. The saving in the latter item under favorable conditions may run as high as 50 per cent.

Makes Improvements in Heavy-Duty Trucks

The Four Wheel Drive Auto Co. of Clintonville, Wis., has announced a complete new line of heavy-duty trucks for 1933. The models range in size from the 2 to 2½-ton four-wheel drive to the 15-ton six-wheel drive, and incorporate many new improvements.

The 1933 model of 3½ to 4 tons capacity.



The ½-cu. yd. excavator equipped as a shovel.

Model CU 6 of 3½-4 tons capacity is designated for road-building and general pit and quarry service. It has been developed over a period of several years. The new model for 1933 has a decided improvement in appearance and many mechanical advantages over its predecessors. The new cab is of the aero-dynamic type with an internal sun visor and has all the appointments of a pleasure car, including rear-view mirror, windshield wiper, and a redesigned dash with indirectly lighted airplane type instruments in a unit panel. Side vents at either side of the floor board and dual rear windows provide ample air circulation for hot summer days.

The motor in this model is a 6-cyl., 7-bearing crankshaft unit, rated at 91 hp. with a piston displacement of 411 cu. in. Of the L-head type, the motor has a Ricardo high-turbulence head and is said to be unusually economical in operation. There are five speeds forward and one reverse in the heavy-duty sliding jaw clutch transmission, providing a speed of 32 mi. per hr. in the standard 7.35-to-1 gear ratio. Optional ratios give speeds of 19.5 mi. per hr. to 41 mi. per hr. in high gear, depending on the customer's requirements.

The wheelbase is 147 in. with three others optional—159 in., 169 in., and 179 in.—can be furnished if desired. The tread has been increased from 60 to 72 in. and the motor, transmission, etc., dropped 4 in., thus lowering the center of gravity and securing better roadability. The turning radius is also shortened considerably by the increase in tread width. The regular set-back front-axle design is employed as in former models.

Excavator Revolves on Ball-Bearing Turntable

The Sargent Scout, a ½-cu. yd. excavator convertible from shovel to drag-line, is being marketed by the Sargent Machine Co., Inc., of Ft. Dodge, Ia.

The machine is featured by compactness, lightness and simplicity of design—and in speed and flexibility of performance is said to represent a new standard of portability, workability and dependability.

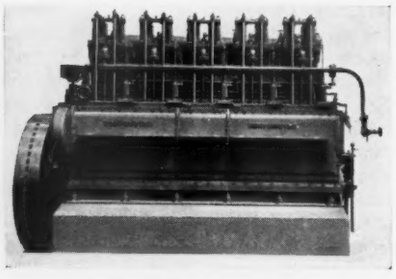
Instead of using a center pin, Sargent engineers have designed and patented a ball-bearing turntable which is proving a complete success. The upper-deck revolving frame is supported on a 48-in. fixed bottom frame by 75 chrome-nickel steel balls 2 in. in diameter. The balls roll in a dust-proof race and distribute the load evenly to the bottom frame. To prevent any tipping action, a second race filled with 155 smaller ball-bearings is installed under the bottom frame and attached to the upper-deck frame by means of take-up set screws, creating a perfectly balanced machine rolling on ball-bearings both top and bottom.

The machine is powered by a McCormick-Deering Model 200 four-cylinder gasoline engine, and wide use

of welded parts insures strength without extra weight. As a shovel, the boom attachment is 15 ft., 6 in. long with a 12 ft. dipper stick. When used as a crane or drag-line a 30 ft. boom is employed, although a 35 ft. boom is optional.

New Diesels Meet Wide Range of Requirements

Covering power requirements from 50 to 1,000 horsepower, in two- to eight-cylinder units, an improved line of four-cycle direct-injection moderate-speed Diesel engines for stationary and marine services, has recently been introduced by the Worthington Pump & Machinery Corp., Harrison, N. J. It is said that the final design of these engines was established only after several years of experimentation and operation under actual working conditions. The result is a series of simple, rugged, dependable and accessible units incorporating only time-tried features and highly standardized to meet all present needs for small and moderate-powered engines.



Stationary Diesel power unit.

Among the salient features of construction of these Diesels are: individual fuel pumps for each cylinder, with fuel lines of equal length, hydraulically control the injection of fuel; individual air starting pilot valves control the admission of starting air to each cylinder; and spray valves are pressure actuated, no push-rods or levers being used. In the larger engines, air inlet and exhaust valves are carried in removable and interchangeable cages, the exhaust-valve cages being water cooled; in the smaller engines, these valves (also interchangeable and adjustable) seat directly in the cylinder head and operate in removable bushings.

Lubricating oil is circulated, through a cast-in main duct in the base with cast-in branches leading to the bottom of each main bearing, by an attached pump. From the main bearings, the oil reaches the crank and wristpin bearings under pressure through drilled passages in the crankshaft and connecting rods. Other points requiring lubrication—camshaft gear, governor, etc.—are supplied with oil under pressure from the flywheel end of the main oil duct. In all but the smallest engines, the cylinders are two-point lubricated by force feed.

Of special interest is the fact that all of these Diesels easily can be converted to operation on manufactured or natural gas—the same base, frame, crankshaft and connecting rod is used for both engines. The camshaft is the same except that the fuel cams are omitted or not used if the engines are to operate on gas.

A Producer Points Out Some Defects in Our Economic Scheme

To the Editor:

We have read with considerable interest the different editorials which you have been writing. We feel that the editorial on the cover page of your issue of Sept. 7 is very timely and to the point, but I suppose that everyone feels the same way about it that we do, and that is, the situation is so highly complicated that there is little that an individual can accomplish. We have been trying for the last year to create interest in a certain procedure, which we felt was thoroughly economic and highly advantageous to business generally. There seems to be some movement at this time to do something along the lines which we have been advocating. Whether our efforts had anything to do with it or not is, of course, unknown and makes no difference. The whole point is to get it done.

It does seem ridiculous, however, that business men generally are willing to accept the theory of the periodic booms and depressions. If a similar situation would happen in a manufacturing plant, or in an engine or any piece of machinery, work would immediately be started to trace the cause and the chances are it would be found very quickly and eliminated. For instance, we can hardly conceive of an automobile builder willing to produce year after year an engine which had a periodic knock or other defect, and who would accept this type of engine as being the ultimate that he was able to produce.

It appears to us, however, that the trouble possibly goes back to our money system, and that the people who are most familiar with our money system very probably to a certain extent profit by these defects, and, consequently, are unwilling to make any move to correct them, either through selfishness or absolute fear of tampering with the machinery. The others are theorists, and while their theories might be correct, we are all, naturally, afraid to allow them to start tampering with a highly complicated piece of mechanism for fear that they will cause more wreckage than any good that they can accomplish.

It seems to me that the uneconomic system that we have now developed is one which, instead of acting like a governor on an engine, acts just the reverse in that the faster we go, the more the engine is accelerated and, conversely, the slower we go, the more the gasoline is choked from the engine. When the system is geared up to a high rate of speed, credit becomes abundant and tends to accelerate the speed still further, and when it slows down, credit is automatically withdrawn, which still further slows down the engine, until, as in this instance, we have almost reached the stopping point.

Stuart Chase, in an article in the July issue of *Harper's*, entitled, "The Case for Inflation," presents some very interesting data. After dissecting the whole system and pointing out a number of defects . . . he arrives at the conclusion that the only way to cure a depression is to get the people back to work and reëstablish buying power. Private industry must, of necessity, keep its house in order to preserve this credit, but the government, which issues the money is or should be somewhat above the laws which govern private industry, and it should act as a balance-wheel by speeding up large programs of public works when employment becomes subnormal, and curtailing this operation as soon as surplus labor is reëmployed. In particular, his idea now is that we need a tremendous government construction program, mainly roads.

In times of radically declining prices on finished, semi-finished and raw materials, and in a period when the labor market is fluctuating widely and orders have become conspicuous by their absence, it takes a rather foolhardy individual in charge of a business to defy these currents and maintain a full manufacturing schedule at full wages, with a full complement of men. We all know that in order to correct this depression, we have to get the jobless back to work, but to do it as individuals, as above mentioned, simply means bankruptcy for those individuals, with the loss of employment for all while at least some could have been salvaged by following the tide. The government is the only agency which is not governed by these principles, and it seems to me logical that the government must, at least in part, act as a balance-wheel to reabsorb those thrown out of work in times of calamity until an equilibrium is reached.

At this time there is a vast amount that individuals could do, that is, by realizing that labor and materials are cheap. If credit can possibly be obtained, it is an ideal time to build for the future, and the disseminating of this idea is probably what will bring us out of the depression.

Keep up your good work!

VALLEY DOLOMITE CO.,
Granite City, Ill. C. M. Day,
Sec'y.-Treas.

Saving Through Safety

"Reasonable Care" in Dust Elimination Held Plant's Responsibility

By FREDERICK WILLSON, M. D.
President, Willson Products, Inc.

THE harm wrought in industry by diseases due to inhalation of dust and fumes is, as yet, not so well recognized as are those visible injuries caused by industrial accidents. Nevertheless, the employer who has at heart the welfare of his workmen and the best monetary interests of his company should wish to have some information on this subject, that he may not err through ignorance of the danger of dust and fumes or of the liability under the law which he must always face.

Although industrial respiratory diseases are not included in workmen's compensation acts in most states, employers are in no sense relieved thereby from their duty and responsibility. Probably one of the most informative of recent opinions bearing on this subject is that of Judge Cutler sitting in the Supreme Court of the State of New Jersey. Judge Cutler said:

"It was the duty of the defendant company to exercise reasonable care that the place in which it set the deceased at work, and the system or method adopted by it for doing the work, should be reasonably safe for the plaintiff, and free from latent dangers known to the defendant company, or discoverable by an ordinary prudent master, under the circumstances. It was also the duty of the defendant company to exercise reasonable care and skill to provide safe machinery and appliances in which the deceased was employed, and in keeping such machinery and appliances in a reasonably safe condition for such use, including the duty of making inspections and tests at proper intervals while he was so employed. If the defendant failed to perform this duty, and the plaintiff contracted the disease from which he died by reason of such neglect, the plaintiff can recover unless the deceased assumed the risk of his employment, or was guilty of what the law terms contributory negligence."

The above opinion places great stress on "reasonable care" and, of course, no employer can observe reasonable care unless he has at least a little knowledge about the nature of dust and fume hazards.

It may be said, first, that large and heavy particles of earthy and metallic matter generally do not constitute a respiratory hazard, because such particles, being large, do not remain in suspension in the air and even when breathed by workmen are almost invariably caught on the mucus membrane of the nasal and pharyngeal passages. Such large particles may unpleasantly dry the secretions, causing the workman to hawk or spit, but the inconvenience occasioned is so marked that the nose and throat are soon cleared of these large particles of dust. In other words, large dust particles constitute a source of local irritation instead of lung irritation.

Foreign particles in the air become dangerous to human beings when their mass is so slight that they readily remain in suspension in the atmosphere. Such particles when subjected to measurement generally indicate a size under 5 or 10 microns (a micron equals 1/25,000 in.) and are therefore so minute as separately to be invisible, although when in great concentration such dust can be detected in the atmosphere in the form of a cloud, and in the accumulations of powdery material which settle on everything and everywhere.

Under 5 microns in size dust particles readily pass through the mouth and nose, traverse the bronchial passages and lodge in the alveolar tissue, from which remote parts of the lung structure they can not be dislodged by hawking or coughing.

Suspended matter in air may come under the classification of fumes as well as dust. Fumes signify "liquid or solid particles from 0.2 to 1 micron in diameter formed by physico-chemical reactions such as distillation, condensation and combustion. Acid mists, ammonium chloride, lead, zinc oxide, and the like, can be produced in the form of fumes."

Naturally, the more concentrated the quantity of dust and fume in suspension in the atmosphere the greater the danger to which the workman is exposed and the smaller the particles the greater the likelihood that entrance into the lung interstices will ensue. The size of particles in prolonged suspension in the air is more likely to be under 5 microns than over; probably the most dangerous sort of dust is that ranging from 2 microns to 0.5 micron, or smaller, because, as just stated, these impalpable particles readily remain in suspension in the air. The size of fume particles, as already given, ranges from 1 micron to 0.2 micron in diameter. In other words, the smaller the particles the greater the danger; unaware of this fact employers and workmen, unless specially warned, are prone to regard such impalpable dust as altogether harmless.

To the lay mind it seems strange that the human body reacts so differently to the character of these microscopic particles which find their way into the lungs. Some substances can be inhaled for considerable periods with comparatively slight physical effect, while other substances, even on brief physical exposure, tend to start inflammatory processes in the lung tissue, some kinds of which advance progressively, even if exposure ceases, until death results. All types of fine dust containing "free silica" as "quartz" are prone to set up inflammatory processes in the lung tissue, serious conditions which can not be completely checked when once started and which result in much physical suffering and in premature death. Other dust and fumes entering the lungs may become absorbed into the blood stream and cause general poisoning with symptoms of bodily effect varying according to the toxicity of the substance. Long continued absorption of toxic dust and fumes often results in complete disability, ending in death.

Scientific knowledge of the results of dust exposure has not progressed far enough to predicate exactly the degree of danger in every kind of dust and fume. The only safe way for an employer is to regard all dust in industry as a hazard. Under best conditions it can not be other than harmful to a degree, while under adverse conditions the shortening of life is almost inevitable. We do know, however, that breathing of dust under the following conditions is seriously harmful:

Lead dust and fumes as found in smelting and burning operations, pottery manufacturing, painting, lead tempering, paint spraying, battery, rubber manufacturing and all other occupations in which lead is an essential material.

Arsenic dust and fumes, as in smelting, manufacturing insecticides, spraying of fruit trees, and the like.

All kinds of operations in which dust of free silica is present, as granite cutting, stone crushing, sand pulverizing, sandblasting, the mixing of glass materials and glazes, and so on through a long series of industrial operations.

Asbestos and every operation in which it is used.

Fur cutting and felting (mercury poisoning).

The making and handling of spraying material with nicotine content.

Fumes of zinc and brass, from brass founding, smelting, autogenous welding, and other operations of like character in the presence of zinc. (In this group the results are unpleasant and temporarily incapacitating but not cumulative in effect.)

Besides the above operations, unpleasant results may follow exposure to such dusty conditions as cleaning of factory floors and walls in the presence of germ-laden dust, threshing and cleaning of grain, and numberless other operations tending to introduce into the human system irritating and poisonous material.

Under questionable working conditions it is plainly the duty of the employer to see that as much dust as possible is removed by an adequate exhausting system applied as closely as possible to the dust- or fume-producing operation. In many cases, however, the nature of the operation makes direct dust exhaustion difficult, if not impossible. Always the workman is most affected by the minute particles suspended in the air around and about where the work is done. Workmen frequently have to move about, which adds to the difficulty of getting them to use protective devices of a fixed character. In view of these considerations it is also the duty of the employer to see that each workman is provided with a respirator so selected and designed as to be amply effective and at the same time sufficiently comfortable to insure continuous use. There has been great improvement in the construction of dust and fume respirators within the last few years and workmen will probably be more willing to use proper protective means than in the past when such apparatus was clumsy and unpleasant to wear.

"Reasonable care" renders it necessary that employers should not select respirators in a haphazard sort of way, but should inquire into the performance of the particular type of respirator offered for sale and thus be sure that the device selected is the correct type for the nature of protection required. Such a degree of precaution not only insures protection to the workman but also enables the employer, in the event of a damage suit, to establish the fact that he had supplied devices of modern design, determined quality, and established protective performance. Only by such care can legal liability be avoided or, more important still, can workmen be protected against the hidden and unrecognized hazards of their occupation.

Reputable manufacturers of safety devices should by their own researches and tests be in a position to suggest the type of respirator best adapted to each kind of operation and it is advised that they be consulted or be permitted to make a survey, dust count, or whatever form of study the condition merits.

Nowhere more than in industrial dust and fume diseases is prevention better than cure—if indeed the penalty for neglect, makes cure possible at all. More often, unfortunately, the price of ignorance, neglect, or carelessness is the price of human life itself.

Accident Frequency Up in California Quarries

The stone-quarrying industry of California, including such related activity as rock-crushing, rock-dressing, and the manufacture of cement and lime, conducted its operations during the calendar year 1931 with 5,981,014 man-hours of labor. In connection with these operations 74 lost-time accidents occurred among the employees for each million man-hours during which the men worked. This accident rate was revealed by a study of reports which the United States Bureau of Mines received through cooperation with the quarry companies and the California Industrial Accident Commission. The rate for 1931 was about 4 per cent. higher than the corresponding rate for the previous year.

The reports showed that 122 quarries were in operation during all or part of the year and that the number of men employed was 3,328, of whom 1,361 worked in the quarries and 1,967 worked at the cement mills, rock-dressing plants, or on other work outside the quarries. The employees worked 771,336 man-shifts, an average of 232 shifts per man. Most plants worked on an 8-hour-a-day basis, but 7¾ hours was the weighted average length of shift.

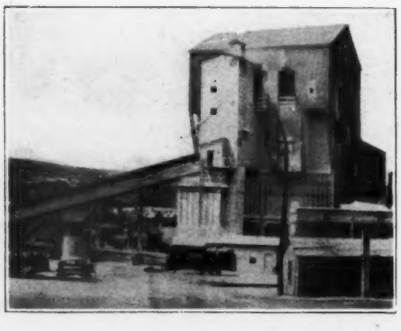
Conducts Campaign for Multi-Wall Paper Bags

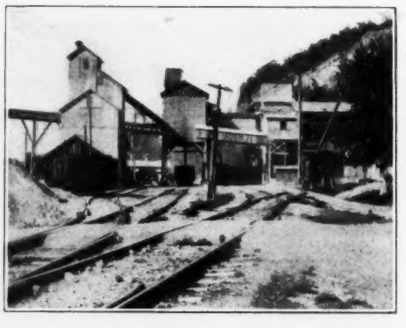
The Adams Bag Co., Chagrin Falls, O., an affiliate of the Chase Bag Co., New York, N. Y., is conducting a campaign to acquaint users with the ten important features of its improved multi-wall paper bags.

The bags are supplied in 2-, 3-, 4-, and 5-ply stock. The features of the improved containers are listed as follows: (1) greater strength, (2) more positive closing valve, (3) multi-seal guard against moisture, (4) square ends, (5) attractive design, (6) economy of warehouse space, (7) one hand loading operation on valve-bag packer, (8) printing on six sides, (9) easier handling, and (10) solid and even stacking.

A Correction

An item on page 10 of the Sept. 7, 1932, issue of PIT AND QUARRY announced the new plant of Brewer & Brewer & Sons, Inc., at Chillicothe, O., stating that its capacity was "125 tons per day and a maximum of 200 tons per day." This should have read "125 tons per hour with a maximum of 200 tons per hour." The mis-print was called to the attention of the editor by C. G. Milburn of the Milburn Machinery Co., Columbus, O., designer of the operation.





HOW the accident record at the Krause, Ill., and Valmeyer, Ill., plants and quarries of the Columbia Quarry Co., St. Louis, was reduced from 54 lost-time mishaps in 1930 to but 2 accidents involving a loss of time in 1931, was interestingly told in an article by E. A. Heise, the company's safety engineer, in the August 10, 1932, issue of PIT AND QUARRY. Above are pictured the two plants and three of the men who helped make this record possible. The Krause plant is pictured at the left and part of the Valmeyer operations are seen at the right. The center picture shows, from left to right: C. E. Klaus, superintendent of the quarry at Krause; E. A. Heise, safety engineer; and F. A. Krewer, quarry superintendent at Valmeyer.

Eighteen tons per hour from a No. 19 Crusher–100% through three-eighth inch opening using less than fifteen horsepower

THE following is the result of a test on a No. 19 Kennedy Ball Bearing Gearless Crusher.

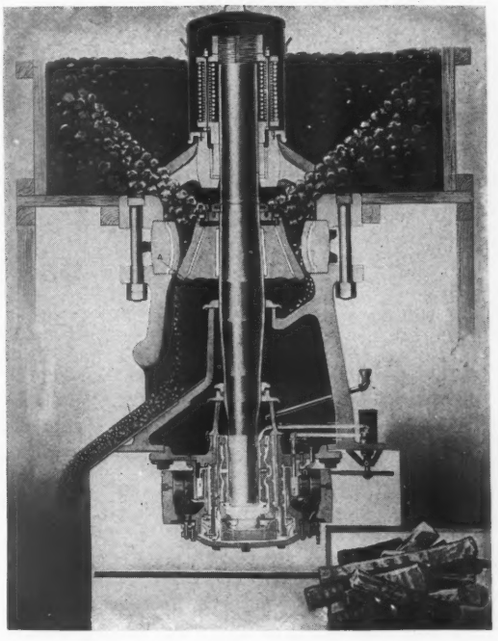
Exceedingly hard glacial gravel, 1½" and plus ⅝", was crushed for sand for concrete purposes, and less than fifteen horsepower was used.

The same crusher can be opened up and 1½" stone can be produced at a rate of from 30 to 50 tons per hour.

With the opening set to ⅛" on the closed side the following results were obtained:

Minus ⅜"	100 %
Plus 3 mesh	21½%
Minus 3—Plus 4	17 %
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15 %
Minus 48—Plus 100	4 %
Minus 100	5½%

This was crushed at the rate of 18 tons per hour.



Built in various sizes with receiving openings from 1¾" to 14". Produces sizes from ⅛" to 3", with capacities up to 620 tons per hour on the larger sizes.

The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to do more crushing, size for size, of any given material, with less power consumption, than any crusher ever built. 90% Of the power input to motor is applied direct to breaking the rock between head and concaves. The head and shaft of the type "S" crusher is suspended on springs to permit tramp steel to pass through. The ball-and-socket eccentric is self-aligning. This crusher may be operated by a synchronous motor, built in the pulley of the crusher, or by belt from standard motor. This crusher takes one-half the power required for a geared crusher, and saves 80% in the cost of maintenance.

We manufacture a complete line of primary jaw and gyratory crushers, ball mills, rod mills, screening, elevating, and conveying equipment, etc. Complete information describing any or all of this machinery will be sent on request. *Send for latest information on our vibrating screen.*

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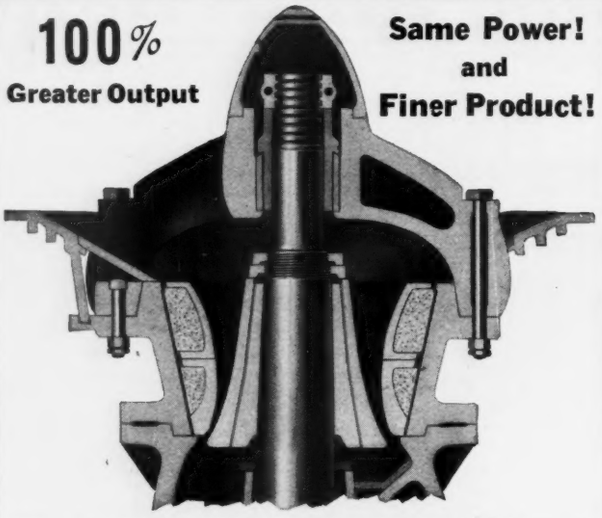

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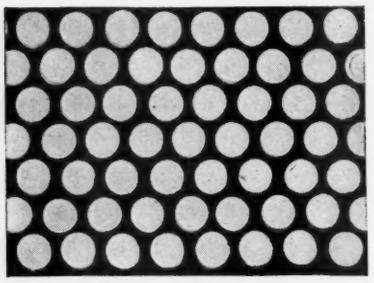

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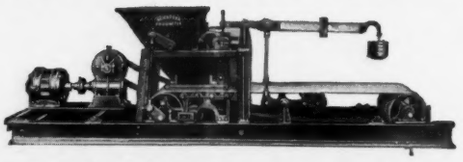

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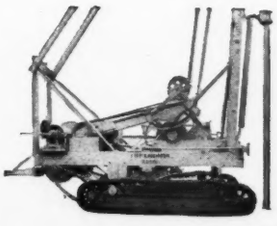

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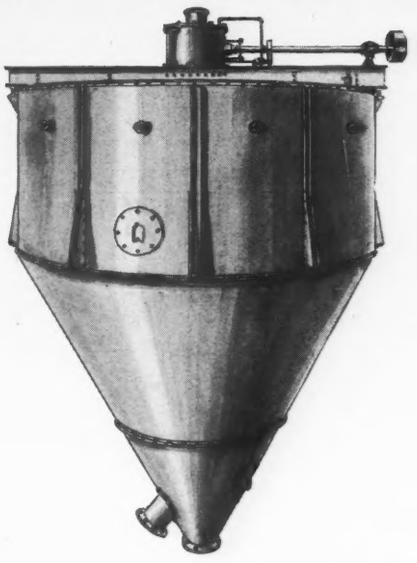

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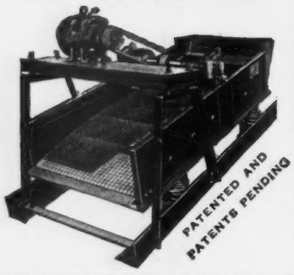

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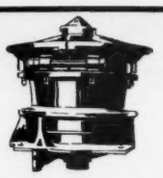

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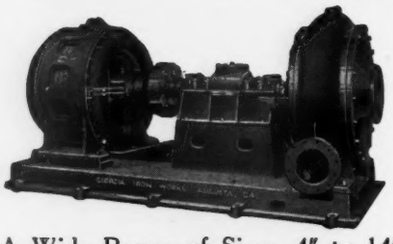

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The 26 numbers of Pit and Quarry issued during the year contain information on every phase of your interest as an operator, and therefore constitute a veritable library well worth preserving for reference purposes. Do you preserve your copies of Pit and Quarry?

Many operators mark articles, paragraphs and statistics, here and there, in each number before filing . . . to find, after months, that they are in need of this information; whereupon they glance through their "library" and readily resurrect the "lost" information. Try it!

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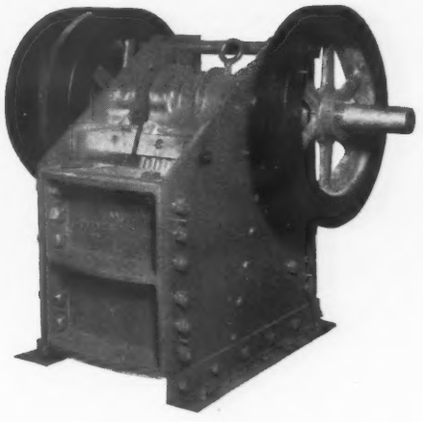

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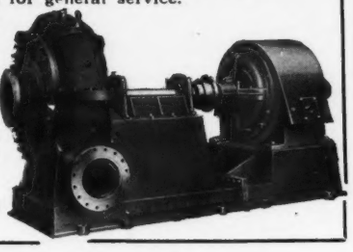

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1-200	Wsthse.	440	Slip Ring	500
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Many operators mark articles paragraphs and statistics, here and there, in each number before filing . . . to find, after months, that they are in need of this information; whereupon they glance through their "library" and readily resurrect the "lost" information. Try it!

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PLAINVILLE (cont.)

Product and Annual Capacity: Crushed trap rock 300,000 tons.

Stripping: Type B Erie shovel and trucks. Drilling and Blasting: 2 No. 50 BE Armstrong well drills, 2 X-71 Ingersoll-Rand drills, 6 Ingersoll-Rand hammer drills. Digging and Loading: 2 No. 37 Marion electric shovels. Delivery to Plant: 4 Mack trucks, Easton Won-Way bodies. Primary Crushing: 42-in. by 54-in. Buchanan jaw crusher. Secondary Crushing: 5½-ft. Symons cone crusher. Sizing: 6 revolving screens.

***Sherman Sand & Stone Co.** **CrTrR**

Branch of New Britain, Conn.

Plant Executive: F. C. Stocks (New Britain, Conn.), gen. mgr., supt., specifies equipment.

Product and Annual Capacity: Crushed stone 70,000 tons.

Stripping: Erie steam shovel. Drilling: 2 tripod drills. Digging and Loading: Erie steam shovel. Delivery to Plant: Truck. Primary Crushing: 16-in. McCully crusher. First Sizing: 60-in. by 10-ft. revolving screen. Secondary Crushing: 6-in. McCully fine reduction crusher, No. 4 McCully crusher. Second Sizing: 60-in. by 20-ft. revolving screen. Storing: 700-ton wood bins. Shipping: Trucks.

Vulcan Sand & Stone Co., Inc. **SG**

Plant Executive: A. J. Martin, gen. mgr., pur. agt., specifies equipment.

Products and Annual Capacity: Sand and gravel 50,000 tons.

Nature of Deposit: Bank. Stripping: Skimmer. Digging, Loading and Delivery to Plant: Electric dragline. First Screening: Telsmith revolving screens. Washing: Telsmith screen, settling tanks. Storing and Packing: Crane. Shipping: Trucks, railroad.

REDDING Fairfield

Redding Marble Co. **CrM**

Branch of New [illegible] Conn.

Products: [illegible] white marble and agstone.

GEOGRAPHICAL

ROCKYHILL Hartford

Connecticut Quarries Co., Inc. **CrTrR**

Branch of New Haven, Conn.

Plant Executives: W. F. Quinn, supt.; F. Tolli, eng.; F. H. Edwards (Meriden, Conn.), gen. supt., specifies equipment.

Product and Annual Capacity: Crushed trap rock 125,000 tons.

Stripping: Type B Erie shovel and teams. Drilling and Blasting: 2 Ingersoll-Rand hammer drills, 2 X71 Ingersoll-Rand drills. Digging and Loading: 2 Type B Erie shovels. Delivery to Plant: Mack truck, International truck. Primary Crushing: 30-in. by 42-in. Buchanan jaw crusher. Secondary Crushing: No. 7½ Allis-Chalmers McCully gyratory crushers, 2 No. 5 Allis-Chalmers, McCully gyratory crushers. Sizing: 2 revolving screens, Niagara vibrating screen.

SEYMOUR New Haven

Seymour Sand & Stone Co. **CrG-SG**

TARIFFVILLE Hartford

Ialf Co., Edward **CrTrR**

Branch of Hartford, Conn. Member of Natl. Crushed Stone Assn.

For detailed information see Farmington, Conn., plant.

TORRINGTON Litchfield

Iffland Lumber Co., John C. **RmCon**
S. Main St.

Plant Executives: Earl E. Iffland, supt., eng., and Arthur B. Iffland, gen. mgr., specify equipment.

Products and Annual Capacity: Transit-mixed concrete 3,000 cu. yd.

Handling to Plant: Aggregates by gravity; cement by hand. Mixing and Delivery to Job: Agitator trucks

Iffland Lumber Co., John C. **SG**

2 plants. Formerly Frank W. Fuller.

Product and Annual Capacity: Aggregates 40,000 tons.

Digging and Loading: Power shovels and draglines. Delivery to Plant: Conveyors. Sizing: Wet screening and washing.

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Chicago, Ill.

Place), sec.; John Jugler (White St. Extension), supt.

Plant: Danbury, Conn.

Connecticut Quarries Co., Inc. **CrTrR**
67 Church St., New Haven, Conn.

T. R. Blakeslee, pres.; A. L. Worthen, v.-pres, gen. mgr.; H. L. Blakeslee, sec.; R. J. Reigeluth, tr.; F. H. Edwards (Meriden, Conn.), gen. supt.

Plants (8): Cheshire, Conn.; Granby, Conn.; Meriden, Conn.; Mt. Carmel, Conn.; New Britain, Conn.; Plainville, Conn.; Rockyhill, Conn.; Wallingford, Conn.

Connellsville Bluestone Co. **CrSt**
305 W. Crawford, Connellsville, Pa.

Fred S. Opperman, pres., gen. mgr.; John T. Wurtz, tr.

Plant: Connellsville, Pa.

Connersville Gravel Co., Inc.
Connersville, Ind. **ConPr-CrG-SG**

Fred Neuman (Connersville), pres.; O. A. Kirkham (Lewisville, Ind.), v.-pres.; Clyde Piper (Connersville), sec.-tr., gen. mgr.

Plant: Connersville, Ind.

Consolidated Cement Corp. **PC**
111 W. Monroe St., Chicago, Ill.

Managed and operated by Cowham Engineering Co., Chicago, Ill.

John L. Senior, pres.; S. W. Storey, v.-pres.; Howard Miller, sec.-tr.; J. H. Greene, pur. agt.; J. E. Curtis, gen. supt.

Plants (3): Fredonia, Kan.; Mildred, Kan.; Cement City, Mich.

Consolidated Feldspar Corp. **CrF**
1403 Trenton Trust Bldg., Trenton, N. J.

H. P. Margerum (Trenton, N. J.), pres.; N. C. Smith (Brunswick, Me.), v.-pres.; M .A. Murray (Trenton, N. J.), sec.-tr.; R. W. Lawson (Erwin, Tenn.), gen. mgr.; V. V. Kelsey (Trenton, N. J.), sales mgr.; A. Ackerman (Spruce Pine, N. C.), pur. agt.; H. A. Womack (Spruce Pine, N. C.), ch. eng.

Plants (9): Kingman, Ariz.; Topsham, Me.; Trenton, N. J. ([illegible] Sons Co.); Bedford, N. Y.; Ro[illegible] Y.; Spruce Pine, N. C. ([illegible]s Co.); East Liverpool, O. ([illegible] Sons Co.); Keystone, S[illegible]n, Tenn. (Erwin Feldspar [illegible]).

ALPHABETICAL

Consolid[illegible] Quarries Corp. **CrGran**
Bona Allen Bldg., Atlanta, Ga.

A. Fillmore Hyde (381 Fourth Ave., New York, N. Y.), pres.; R. H. Cobb (Atlanta), v.-pres.; A. G. Loomis (Atlanta), tr.; G. A. Austin (Atlanta), gen. mgr.; Nelson Severinghaus (Lithonia, Ga.), supt.

Plant: Lithonia, Ga.

Consolidated Rock Products Co. **CrG-SG**
656 S. Los Angeles St., Los Angeles, Cal. (Main Office); Azusa, Cal. (Eastern Div. Office); 6514 Landershim Blvd., North Hollywood, Cal. (Western Div. Office).

F. J. Twaits, pres., gen. mgr.; Frank W. Clark, v.-pres.; Robert Mitchell, sec.; Carl H. Wittenberg, tr.; L. L. Rogers, gen. prod. mgr.; G. H. Moore, supt. Eastern Div.; R. C. Griffin, supt. Western Div.

Plants (17): Azusa, Cal. (5); Baldwin Park, Cal. (2); Claremont, Cal.; Irwindale, Cal.; Los Angeles, Cal.; North Hollywood, Cal. (6); Orange, Cal.

Consolidated Rock Products Co. **CrLs**
Lakeland, Fla.

William P. McDonald (381 Fourth Ave., New York, N. Y.), pres.; Charles A. Taylor (381 Fourth Ave., New York, N. Y.), v.-pres.; Richard E. Fitzgerald (106 S. Tennessee Ave., Lakeland, Fla.), sec.-tr.

Plant: Brooksville, Fla.

Consolidated Sand & Gravel, Ltd. **SG**
402 Harbor Bldg., Toronto, Ont.

John E. Russell, pres.; J. F. M. Stewart (Royal Bank Bldg.), v.-pres.; A. M. Harnwell, sec.-tr.; G. G. Robinson, gen. mgr.; A. G. Bennett, pur. agt., gen. supt.

Plants (4): Durham, Ont.; Fuller (no P. O.), Ont.; Paris, Ont.; Waterford, Ont.

Consolidated Sand & Stone Co. **CrG-CrQ-SG**
204 Boyce Greeley Bldg., Sioux Falls, S. D.

William Hoese (Mitchell, S. D.), pres.; W. A. Barnhart (Salem, S. D.), v.-pres.; Delbert Wheeler (Sioux Falls), sec.-tr., gen. mgr., pur. agt.

Plants (2): Spencer, S. D.; Wheeler Spur (P. O. Sioux Falls), S. D.

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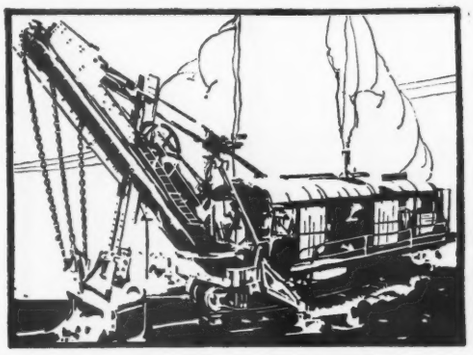

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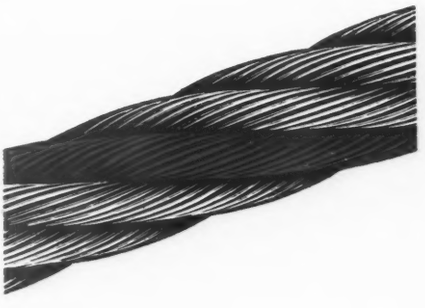

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